DRAFT
TOTAL MAXIMUM DAILY LOAD AND IMPLEMENTATION PLAN FOR DISSOLVED OXYGEN FOR THE FIRST TWELVE MILE SEGMENT OF THE NEW RIVER DOWNSTREAM OF THE INTERNATIONAL BOUNDARY

Imperial County, California

California Regional Water Quality Control Board
Colorado River Basin Region
Palm Desert, California

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LIST OF ABBREVIATIONS

§	Section
NH_3	Ammonia
Basin Plan	Water Quality Control Plan for the Colorado River Basin Region
BECC	Border Environment Cooperation Commission
BOD	Biochemical Oxygen Demand
BTAC	New River/ Mexicali Sanitation Program Binational Technical Advisory Committee
CalBECC	California Border Environment Cooperation Commission
CCNRC	City of Calexico New River Committee
CCTFNR	Citizens Congressional Task Force on the New River
CESPM	Comision Estatal de Servicios Publicos de Mexicali
CFR	Code of Federal Regulations
CILA	Comisión Internacional de Limites y Aguas
CEA	Comision Estatal de Agua
cfs	Cubic Feet Per Second
CAN	Comision Nacional del Agua (Mexican National Water Commission)
CWA	Federal Clean Water Act
CWC	California Water Code
DO	Dissolved Oxygen
FRSH	Freshwater Replenishment
EIR	Environmental Impact Report
EIS	Environmental Impact Study
IBC	International Boundary Commission
IBWC	International Boundary and Water Commission
LAs	Load Allocations
mg/L	Milligrams per liter
MGD	Million Gallons per Day
ml	Milliliter
MOS	Margin Of Safety
MP	Management Practice
NADBank	North American Development Bank
NAFTA	North American Free Trade Agreement
NPDES	National Pollutant Discharge Elimination System
NPS	Non point source pollution
OAL	Office of Administrative Law
ºF	Degrees Fahrenheit
QAPP	Quality Assurance Project Plan
RARE	Preservation of Rare, Threatened, or Endangered Species
REC I	Water Contact Recreation
REC II	Water Non-Contact Recreation
Regional Board	Colorado River Basin Regional Water Quality Control Board
RWQCB	Regional Water Quality Control Board
SAHOPE	Secretaria de Asentamiento Humanos y Obras Públicas del Estado

SEDESOL	Secretaría de Desarrollo Social
SEDUE	Secretaría de Desarrollo Urbano y Ecologia
SEMARNAP	Secretaria del Medio Ambiente Recursos Naturales y Pesca
SLRC	San Luis Rio Colorado
SMR	Self Monitoring Report
State Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
USIBWC	United States Section of the International Boundary and Water Commission
WARM	Warm Freshwater Habitat
WILD	Wildlife Habitat
WLAs	Waste Load Allocations
WQOs	Water Quality Objectives
WQSs	Water Quality Standards
WWTF	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant

SUMMARY

This staff report supports a New River Dissolved Oxygen (DO) TMDL Basin Plan Amendment that addresses impairment (or pollution) of low DO in the New River 12 mile reach downstream of International Boundary, caused by waste discharges from Mexico. Section 303(d) of the federal Clean Water Act (CWA) requires the states to identify and list impaired water bodies, and develop water pollution control plans (or TMDLs) for pollutants that are causing the impairments. The United States (U.S.) Environmental Protection Agency (USEPA) has oversight of the CWA, Section 303(d) program and must approve or disapprove the State's 303(d) List and each TMDL. USEPA is ultimately responsible for issuing a TMDL, if the State fails to do so in a timely manner.

Water quality standards (WQSs) consist of designated uses (or beneficial uses), water quality criteria (or objectives) (WQOs) to protect the beneficial uses, and an anti-degradation (a non-degradation) policy. A TMDL quantifies the amount of a pollutant that a water body can receive and still meet WQSs, and allocates pollutant loadings of that water body to point and nonpoint sources. A TMDL also incorporates seasonal variations and a Margin Of Safety (MOS) to account for uncertainties concerning the relationship between pollutant loads and instream water quality. TMDL load allocations can be expressed in terms of mass per time, toxicity, concentration, or other appropriate measures that relate to a state's WQSs.

DO WQO for the New River is a minimum of 5 (five) milligram per liter (mg/l) at any time. DO is not considered a pollutant, but an indicator parameter for water quality. The main pollutants of concern that cause in-stream low DO are biochemical oxygen demand (BOD) and ammonia (NH_3). This New River DO TMDL identifies the maximum amount (or loads) of NH_3 and BOD that can be discharged to the New River at the International boundary without violating the New River's applicable WQSs for DO.

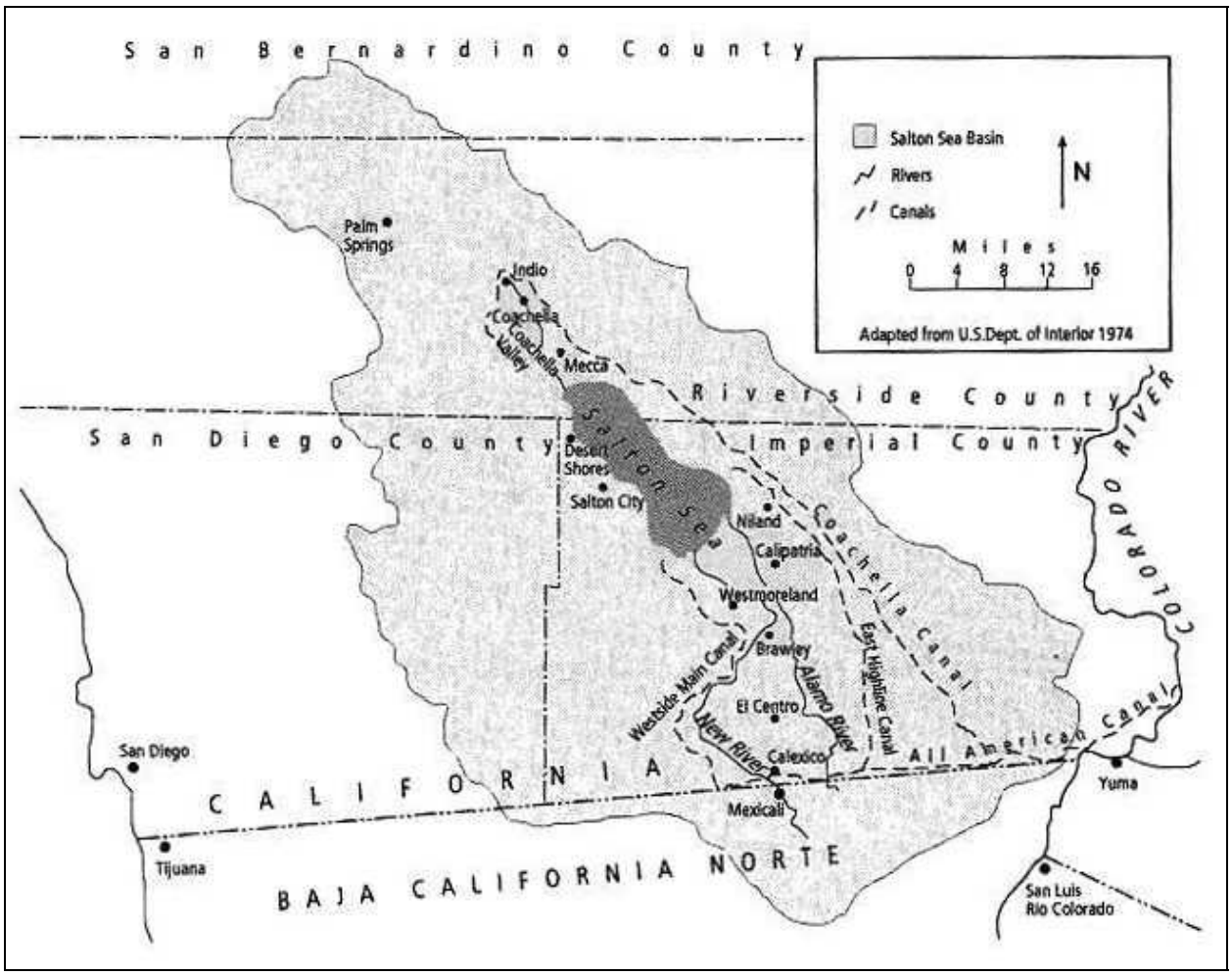
The New River originates in Mexicali Valley, Mexico (Figure A). It flows approximately 20 miles through the City of Mexicali, Mexico, crosses the International Boundary, continues through the City of Calexico, California, in the U.S., and travels northward about 60 miles until it empties into the Salton Sea. The Salton Sea is California's largest inland surface water. The New River watershed is approximately 500,000 acres in size: 200,000 acres of Imperial Valley farmland in the U.S.; and 300,000 acres of Mexico including the Mexicali metropolitan area and agricultural land in Mexicali Valley. The climate of the New River watershed is hot, with dry summers, occasional thunderstorms, and gusty high winds (average annual rainfall is less than 3 inches, and temperatures is in excess of 100ºF for more than 100 days per year). Major soils associations in the New River watershed are within the "wet" series of poorly drained soils.

Sources of flows to the New River are urban and agricultural runoff, and treated municipal and industrial wastes from the Mexicali Valley, Mexico, and the Imperial Valley, California, U.S. In 2007, average flows for the New River at the International Boundary and at the outlet to the Salton Sea were about 125 and 590 cubic feet per second (cfs), respectively.

DO averages for the New River at the International Boundary ranged from 0.8 to 2.8 mg/l for 1997 to 2002. Data and source analysis for this TMDL determined that Mexicali

Valley in Mexico is the most significant source of materials causing New River DO impairments. Las Arenitas Wastewater Treatment Plant (WWTP), which started its operation in March 2007, was designed to prevent Mexico's remaining untreated sewage from discharging to the New River. As a result, DO levels in the impaired section of the New River improved significantly but continue to violate DO WQO.

Figure A: Map of the New River within the Salton Sea Transboundary Watershed (Cohen et al. 1999)



The TMDL proposes to eliminate low DO impairment in the New River first 12 miles reach downstream of International Boundary, and specifies allowable loads of BOD and NH_3 to sources of DO impairments based on steady-state New River DO QUAL2K Model projections, scientific literature, monitoring data, and best professional judgments. The Model proposed loads of 5 mg/l of BOD and 0.5 mg/l of NH_3 for the New River at the International Boundary and these loads addresses sources in Mexico. BOD and NH_3 load allocations in concentration (mg/l) and in mass/day (kilogram (kg)/day) are summarized in Table A.

Table A: New River DO TMDL BOD and NH_3 Load Allocations by Sources

Source	BOD Loads (mg/l)	BOD Loads (kg/day)	NH_3 Loads (mg/l)	NH_3 Loads (kg/day)
Mexico (New River at International Boundary)	5	1523.16	0.5	152.31

The TMDL implementation (2010 to 2012) requests that the Federal Government (U.S. section of the International Boundary and Water Commission (USIBWC) and USEPA):

- Consider measures to assist Mexico to ensure that discharges from Mexico do not violate or contribute to a violation of this TMDL; and
- Continue to conduct water quality monitoring in the New River at the International Boundary.

This TMDL also recommends actions for other third party cooperating agencies and organizations with an interest in the New River's water quality. Staff of the California Regional Water Quality Control Board, Colorado River Basin Region (Regional Board) will track TMDL implementation, monitor water quality progress, enforce provisions, and propose modifications of the TMDL to the Regional Board, if necessary, in accordance with a time schedule.

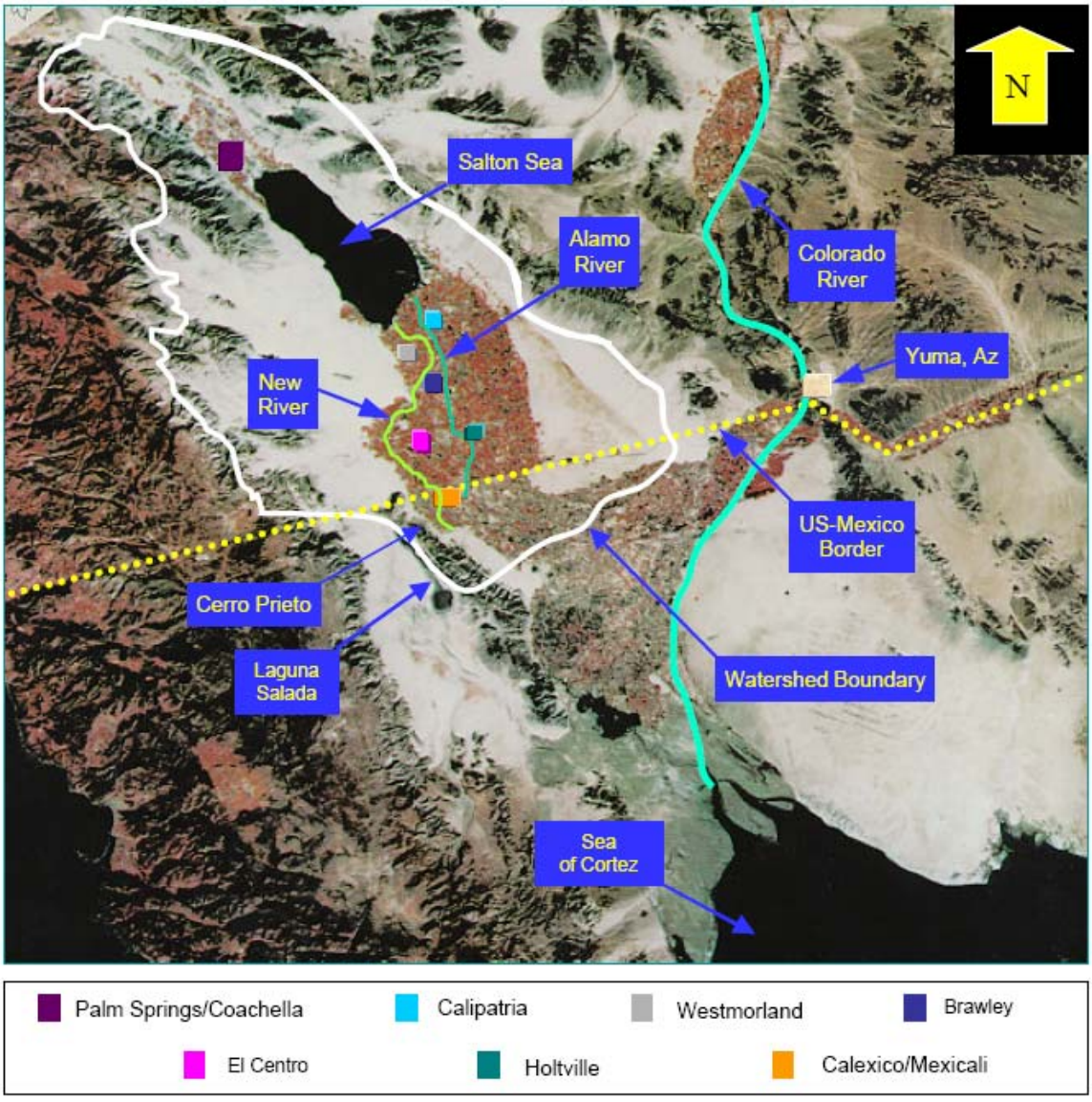
The TMDL is expected to achieve applicable WQSs for DO in the New River at International Boundary by 2012. If DO WQSs for the New River are not achieved by the end of 2012, and as more New River water quality data are collected and evaluated, the TMDL allocations will be revised and implemented in 2013 to 2015, if necessary.

CHAPTER 1: PROJECT DEFINITION

The federal Clean Water Act (CWA), Section (§) 303(d) requires all states to identify and list impaired (or polluted) water bodies, and to develop pollution control plans (or Total Maximum Daily Loads, TMDLs) for pollutants that are causing the impairment. The State of California placed the New River on the 303(d) List for impairment caused by Organic Enrichment/Low Dissolved Oxygen (DO) in 2002. This TMDL is the first phase for improving DO levels in the New River. The first 12 mile reach of the New River downstream of the International Boundary has been prioritized over other New River reaches because of the proximity to the major waste sources that originate in Mexico, as shown by modeling and data analysis.

The New River originates in Mexico (Figure 1).

Figure 1: Salton Sea Transboundary Watershed (Gruenberg 1998)



The New River flows approximately 20 miles through the City of Mexicali, Mexico, crosses the International Boundary, continues through the City of Calexico, California, in the United States (U.S.), and travels northward about 60 miles until it empties into the Salton Sea. The Salton Sea is California's largest inland surface water. Sources of flows to the New River are urban and agricultural runoff, and treated municipal and industrial wastes from the Mexicali Valley, Mexico, and the Imperial Valley, California, U.S.

1.1: WATER QUALITY STANDARDS AND THE TMDL PROCESS

Pursuant to the CWA, 42 U.S.C. Section 1251 et seq., and implementing regulations set forth in Title 40 of the Code of Federal Regulations (CFR), water quality standards (WQSs) consist of:

1- Designated beneficial uses (BUs);
2- Specified numeric or narrative water quality objectives (WQOs) that protect these BUs; and
3- Anti-degradation requirements to ensure that existing uses and the level of water quality necessary to protect the existing uses are maintained and protected (CWA Section 303; 40 CFR Parts 130, 131).

CWA Section 303(d)(A)(1) requires all states to identify surface waters impaired by pollution (i.e., that do not meet WQSs) and to establish TMDLs for pollutants that are causing the impairments. The U.S. Environmental Protection Agency (USEPA) has oversight of the CWA, Section 303(d) program and must approve or disapprove the State's 303(d) List and each specific TMDL. USEPA is ultimately responsible for issuing a TMDL, if the State fails to do so in a timely manner.

A TMDL quantifies the amount of a pollutant that a water body can receive and still meet WQSs, and allocates pollutant loadings of that water body to point and nonpoint sources. Accordingly, a TMDL is the sum of the individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources and natural background sources. A TMDL also incorporates seasonal variations and a Margin Of Safety (MOS), which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. TMDL load allocations can be expressed in terms of mass per time, toxicity, concentration, or other appropriate measures that relate to a state's WQSs.

Section 13001 of the California Water Code (CWC) identifies the State Water Resources Control Board (SWRCB) and all nine Regional Water Quality Control Boards (RWQCBs) as the principal state agencies responsible for the coordination and control of water quality. Accordingly, the Regional Board is required to:

- Identify the Region's water bodies that do not comply with WQSs;
- Rank the impaired water bodies, taking into account the severity of pollution and the uses made of such waters; and
- Establish TMDLs for those pollutants causing the impairments to ensure that impaired waters attain their BUs.

A RWQCB-adopted TMDL must be approved by the SWRCB and State of California Office of Administrative Law (OAL) prior to USEPA's approval and becoming legally effective (CWC Section 13245; CWA Section 303(d)(2); 40 CFR Section 131.5).

1.2: NEW RIVER DO TMDL

In 2002, the State of California listed the New River for impairment caused by Organic Enrichment/Low DO pursuant to Section 303(d) of the CWA Section (42 U.S.C. section 1313(d)). The DO WQO for the New River is a minimum of 5 milligrams per liter (mg/l), as established by the State of California to protect the following BUs: warm freshwater habitat (WARM); wildlife habitat (WILD); preservation of rare, threatened, or endangered species (RARE); water contact recreation (REC I); non-contact water recreation (REC II); and freshwater replenishment (FRSH) (Water Quality Control Plan, Colorado River Basin – Region 7 [Basin Plan]). The Basin Plan can be viewed at:

http://www.waterboards.ca.gov/coloradoriver/publications_forms/publications/docs/basinplan_2006.pdf

USEPA approved the 303(d) listing for low DO in the New River in July 2003. Primary sources for this listing were from untreated or partially treated urban and industrial wastewater discharged to the New River and its tributaries in Mexicali, Mexico as shown by Regional Board monthly data collected from the New River at the International Boundary (IB) from 1997 to 2002. Average yearly DO data for IB were 2.8, 1.5, 0.8, 1.3, 1.69, and 1.13 mg/l for 1997, 1998, 1999, 2000, 2001, and 2002, respectively. This data can be viewed at:

http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/new_river/

These low DO levels were a result of about 5 to 20 million gallons per day (mgd) of raw sewage being discharged into the New River in Mexicali, Mexico as reported by Regional Board monthly reports from Bi-National Observation Tours of the New River Watershed in Mexicali (Regional Board 2002 and 2003).

The history of New River pollution is associated with Mexicali population growth and the inception of irrigated agriculture in the Imperial and Mexicali Valleys (Gruenberg 1998). In 1920, the total population of Mexicali was 6,200. By 1955, approximately 25,000 people lived in Mexicali. Raw sewage from Mexicali was discharged into the New River at that time, generating an odor near the International Boundary that was often overpowering. Flow in the New River increased considerably in 1956 due to the increase in agriculture in Mexicali Valley and the resultant discharge of irrigation return flows to the New River and its tributaries. This diluted the raw sewage temporarily, alleviating the odor at the International Boundary until the 1960s, when sewage loading to the River increased with Mexicali population growth. In 1987, the California Department of Public Health, formerly California Department of Health Services, posted the New River as a public health hazard (California Department of Health Sevices, 1987).

Besides Organic Enrichment/Low DO, the New River is also on the federal CWA Section 303(d) List for impairments by chlordane, chlorpyrifos, copper, Dichloro-Diphenyl-Trichloroethane (DDT), diazinon, dieldrin, mercury, nutrients, pathogens, Polychlorinated Biphenyls (PCBs), sediment, selenium, toxicity, trash, and Volatile Organic Compounds (VOCs). New River TMDLs for pathogens, sediment, and trash have been adopted by the Colorado River Basin RWQCB (hereafter "Regional Board"), and approved by the SWRCB, OAL, and USEPA (Table 1). These three TMDLs are currently being implemented.

Table 1: New River TMDL Approval Dates

	New River Pathogen	New River Silt	New River Trash
Regional Board Adoption	10/10/01	6/26/02	6/21/06
SWRCB Approval	3/21/02	11/19/02	4/18/07
OAL Approval	3/23/02	1/13/03	8/2/07
USEPA Approval	8/14/02	3/31/03	9/24/07

Regional Board staff is proposing this TMDL to address the impairment of the New River in the first 12 miles downstream of International Boundary reach caused by low DO. This TMDL has been developed in accordance with State of California's TMDL Guidance issued in June 2005 and the USEPA's TMDL Guidance published in April 2001. A New River DO QUAL2K Model was developed by Tetra Tech, Inc. to assist Regional Board staff on Data and Source Analysis, Linkage Analysis, and Load Allocations in terms of parameters that cause low DO such as BOD and NH_3 (Appendix F). This model is discussed in Chapter 7 of this proposed TMDL.

1.3: MANAGEMENT AND IMPLEMENTATION ISSUES

A TMDL implementation plan to achieve WQSs is proposed. This approach provides immediate assessment of known sources causing low DO while allowing time for additional monitoring to assess TMDL implementation, effectiveness, and the need for revision. The implementation focuses on monitoring and addressing known and potential causes of low DO from Mexico. If WQOs are not met by the 2012, additional actions will be implemented to control pollutant sources, and to achieve WQSs.

Las Arenitas WWTP in Mexico, which started operation in March 2007, certainly improved DO levels in the impaired section of the New River. However, it is too early to quantify the full impact of the Las Arenitas WWTP at this stage. Regional Board staff and USIBWC will continue monitoring the New River and assessing changes in water quality.

CHAPTER 2: WATERSHED DESCRIPTION

The New River watershed is approximately 500,000 acres in size (approximately 200,000 acres of Imperial Valley farmland in the U.S., and approximately 300,000 acres in Mexico including the Mexicali metropolitan area and agricultural land in Mexicali Valley). Sources of flows to the New River are urban and agricultural runoff, and treated municipal and industrial wastes from the Mexicali Valley, Mexico, and the Imperial Valley, California, U.S

Historically, New River flow at the International Boundary was about one-third of its flow into the outlet of the Salton Sea. New River flows at the International Boundary ranged from about 125 to 257 cubic feet per second (cfs) from 1997 to 2006, For the same period, New River flows at the outlet to the Salton Sea ranged from about 569 to 679 cfs. In 2007, New River flows at the International Boundary and at the outlet to the Salton Sea were about 125 and 590, respectively. Reduction in flows for the New River at the International Boundary was a result of operating a new sewage treatment in Las Arenitas and flow diversion facility in Mexicali, Mexico, in March 2007, which will be explained later in this report.

The climate of the New River watershed is hot, with dry summers, occasional thunderstorms, and gusty high winds. The Imperial Valley is considered one of the most arid areas in the U.S., with an average annual rainfall of less than 3 inches, and temperatures in excess of 100ºF for more than 100 days per year. The average January temperature is 54 ºF, and the average July temperature is 92ºF. Evapotranspiration rates for the Imperial Valley can exceed 7 feet per year, and in hot summer months, can be one-third of an inch per day.

All of the major soils associations within the Imperial Valley are within the “wet” series of poorly drained soils due to their low (less than 0.5 inches per hour) permeabilities. The following three general soil associations dominate Imperial Valley: Imperial; Imperial-Holtville-Glenbar; and Meloland-Vint-Indio [Appendix A].

CHAPTER 3: SOURCE ANALYSIS

This Chapter identifies and characterizes sources of oxygen demanding materials that result in low DO concentrations in the New River. A BOD and Ammonia (NH_3) from Mexico are found to be the main cause of low DO in the New River as shown by analysis of available data to date and New River QUAL2K Water Quality computer model simulations. Loads of BOD and NH_3 to address New River DO impairments were developed by the QUAL2K Model simulations (Chapter 7 and Appendix F).

3.1: METHODOLOGY

Chronic low levels of DO in the water column threaten fish and wildlife communities that utilize the New River as habitat downstream of the International Boundary (IB). Low DO is a result of complex chemical and biological processes that consume the available oxygen in the water column. In this context DO is not considered a pollutant, but an indicator parameter for water quality. The pollutants of concern are the constituents that exert a demand upon the in-stream DO resources or contribute to processes that lead to oxygen consumption.

Processes that may deplete DO are bacterial decomposition of organic matter, and stream eutrophication. Bacteria decomposers respond to increased organic matter with increased growth and biological activity. Increased biological activity leads to increased consumption of DO. Anthropogenic eutrophication arises when excessive amount of nutrients, mainly from sewage and agricultural runoff, stimulates growth of algal biomass. The increase in algal biomass leads to more organic matter sinking to the sediment. Bacteria then decompose the organic matter at river's bottom, consuming large amounts of oxygen during the process.

The source analysis evaluates the potential to consume DO in the New River by discharges from: waste discharge from Mexico; WWTPs regulated by the NPDES Program; CAFOs; natural sources, and from agricultural, stormwater, and urban runoff (see below). The source analysis indicates waste discharges from Mexico are the primary source of oxygen demand in the New River, and the cause for the DO impairment at the International Boundary and several miles downstream. An analysis of each source is described below.

3.2: SOURCES IN MEXICO

As explained earlier in Chapter 1, untreated waste discharges in Mexico to the New River and tributary drains were the major sources of low DO in the New River downstream of IB. These untreated wastes contained high amounts of organic matter that exerts a BOD, consuming in-stream DO. This resulted in chronic low DO conditions in the New River in the U.S., which persisted for more than 20 miles downstream of the International Boundary, and caused listing the New River as impaired by low DO in 2002.

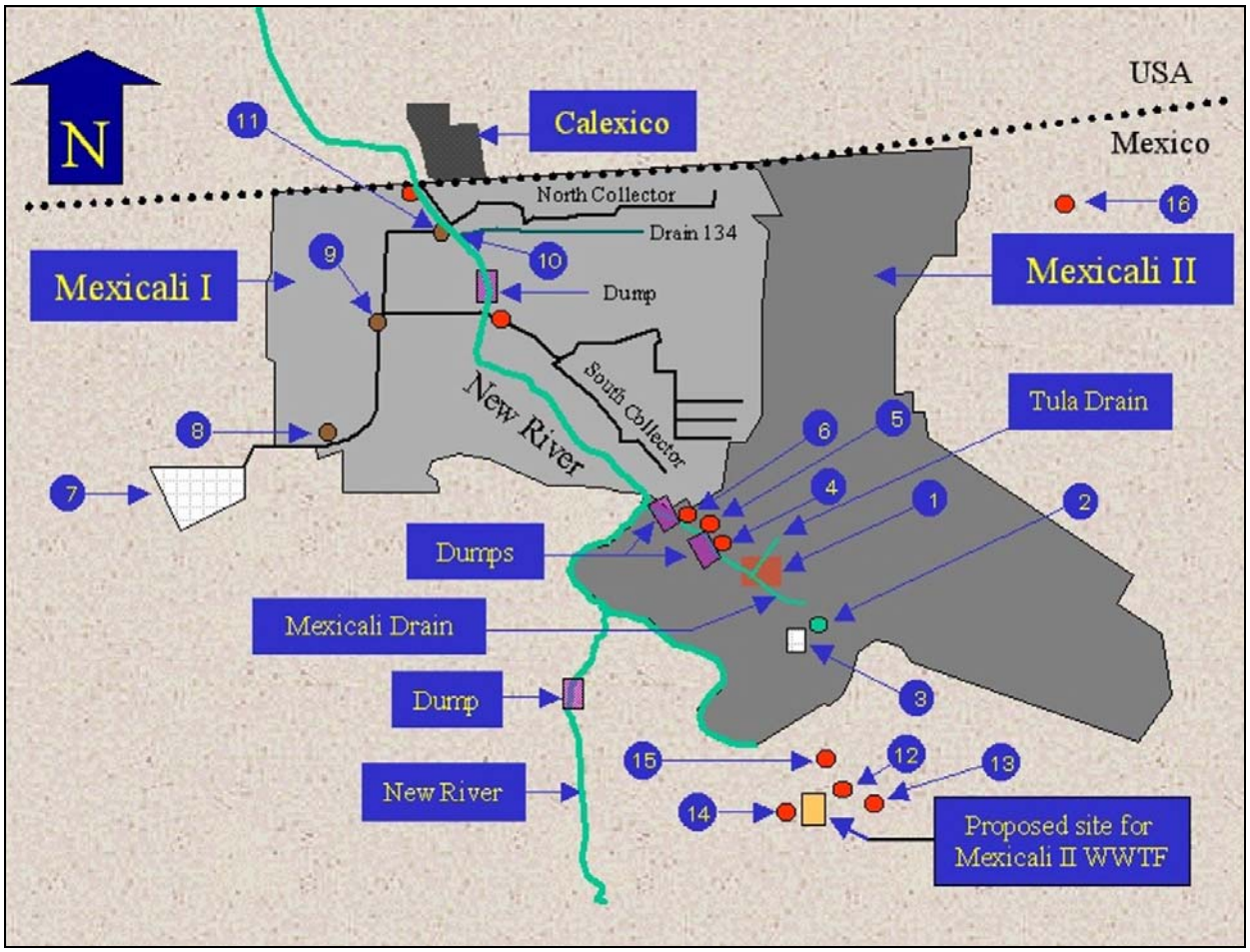
Sewage service for the Mexicali metropolitan area that affects the New River is divided into two areas, Mexicali I and Mexicali II (Figure 3.1). Mexicali I is located in northwest area of city of Mexicali. Mexicali II area is located in the northeast area of the city of Mexicali.

Mexicali I wastewater is treated by the Zaragoza WWTP with a capacity of about 25 million gallon per day (mgd) or 38.7 cfs. The treated wastewater is discharged into the New River through agricultural drains.

Mexicali II wastewater is treated by Las Arenitas WWTP with a capacity of about 20 mgd (Figure 3.2). The Las Arenitas WWTP was fully operational in March 2007. Prior to its completion, Mexicali II untreated wastewater was being discharged into a drain that flows into the New River. Currently, the treated wastewater from the Las Arenitas WWTP is not discharged into the New River. Rather, it is discharged into a drain called the Hardy River that flows north to south towards the Gulf of California in Mexico. Las Arenitas WWTP is designed to prevent Mexico's remaining municipal untreated sewage from being discharged into the New River and its tributary drains.

Water quality data for the New River at the International Boundary from January 2005 to October 2008, obtained from USIBWC, is shown in Appendix B. DO and BOD data is shown in Figure 3.3. Improvements in DO levels in the New River at the International Boundary are apparent as a result of the Las Arenitas WWTP operation.

Figure 3.1: Map of Main Sewage Infrastructure Affecting New River in the Mexicali Metropolitan Area (Note that Proposed Location for Mexicali II WWTP in this Map was Changed as Shown in Figure 3.2)



Mexicali Sewage Infrastructure Identification		
1. Industrial Area: Hidrogenadora Nacional (Conasupo), Quimica Organica, Quipac, Vitromex	7. Zaragoza Lagoons (Mexicali I WWTP)	13. Steel recycling plant
2. Gonzalez-Ortega Lift Station	8. Pumping Plant No. 3	14. Slaughterhouse discharge
3. Gonzalez-Ortega Lagoons (Mexicali II WWTP)	9. Pumping Plant No. 1	15. Maseca
4. Kenmex	10. Drain 134	16. Fabrica de Papel San Francisco
5. Collector Mexicali II bypass	11. Pumping Plant No. 2 and Right Bank Lift Station	
6. Collector Nutrimex bypass	12. Hog farm discharge	

Figure 3.2: Map that Shows Location of Las Arenitas WWTP in Mexico

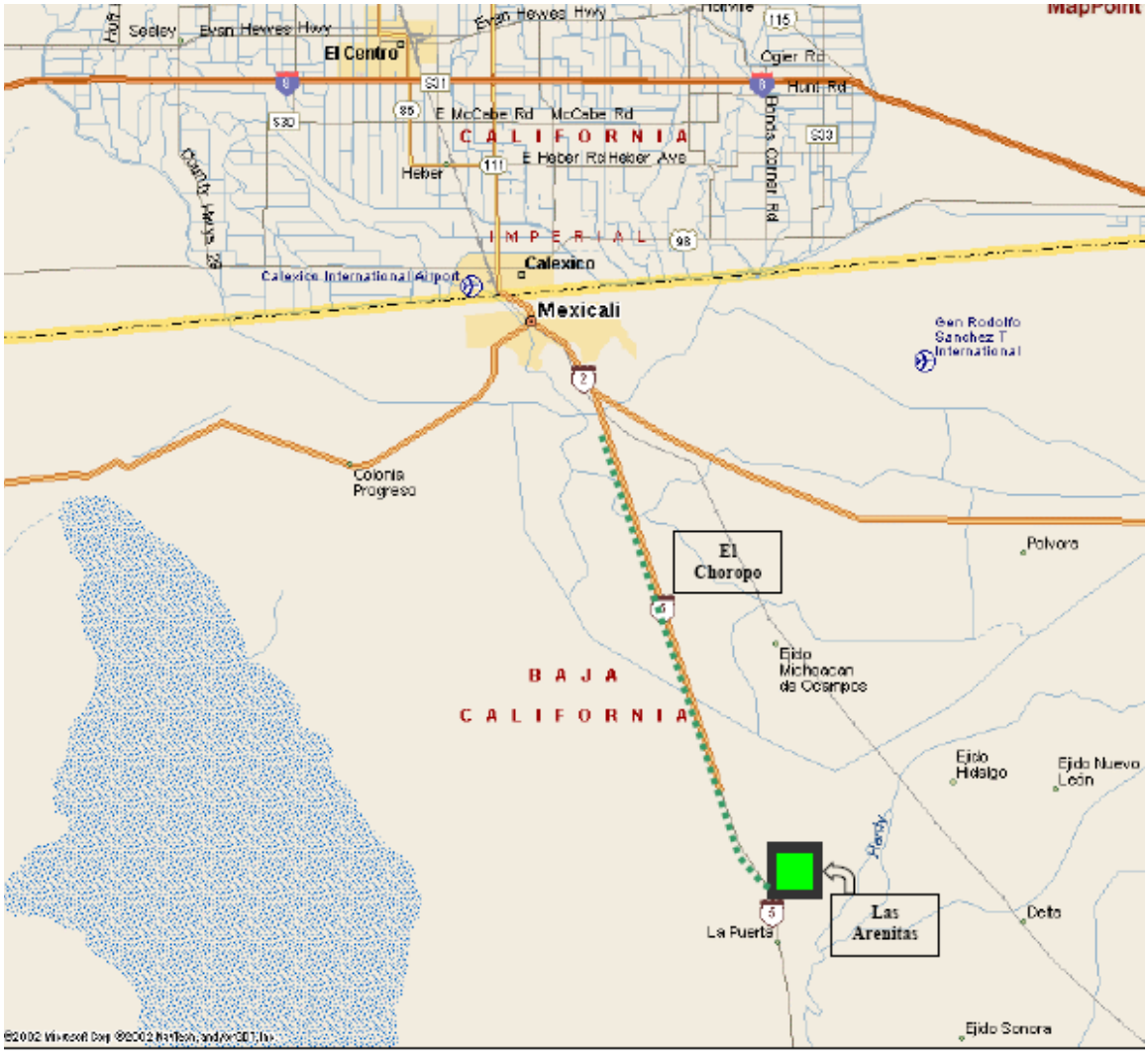
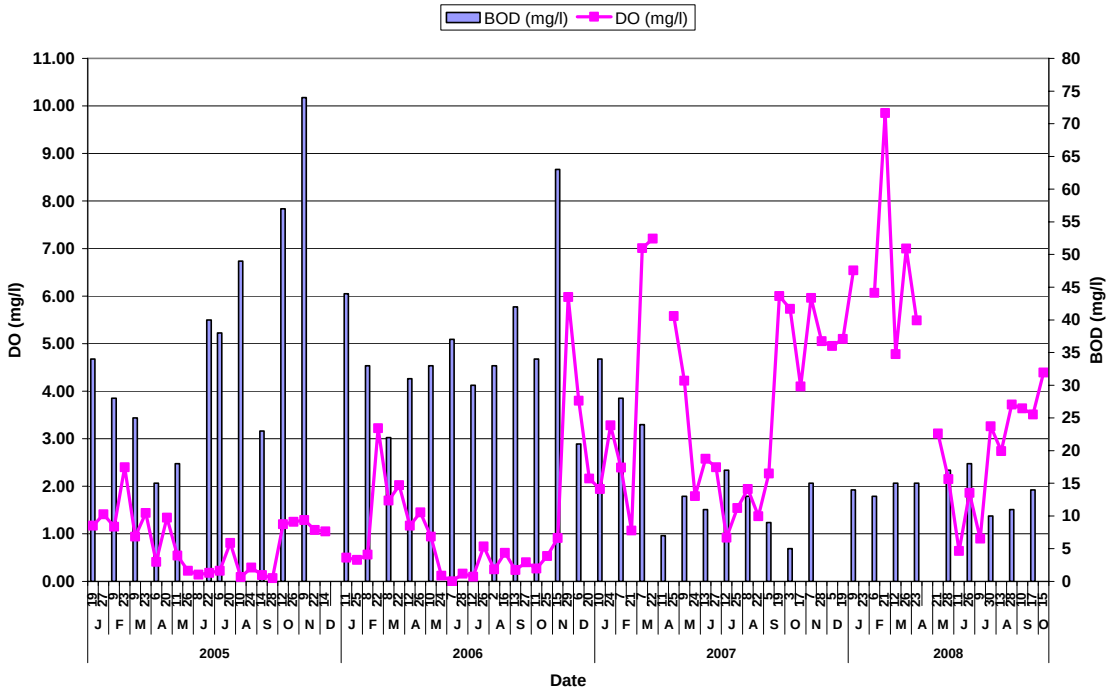


Figure 3.3: DO and BOD for New River at IB (Source: USIBWC)



3.3: NONPOINT SOURCES IN THE U.S.

Agricultural Runoff

In the U.S., the New River is largely sustained by agricultural return flows from the Imperial Valley in California. Agricultural flows from Imperial Valley reach the New River through drains operated and maintained by Imperial Irrigation District (IID) (Figure 3.4). Flood irrigation is the irrigation method of choice. Water running off the field into the drain without percolating into the soil is called tailwater, and may transport organic matter and plant nutrients from the fields to the drains. Water percolating through soil and into an underlying tile drainage system that is not absorbed by crops is called tilewater, and flushes salts from soil.

Tailwater and tilewater can transport organic matter and nutrients from fields with grazing livestock, or fertilized with manure for growing crops particularly after irrigation, which attract birds to insects driven from the soil. Nevertheless, it appears that the potential that agricultural activities contribute oxygen demand materials for New River DO is low relative to other sources from the U.S. and Mexico. The potential that agricultural activities contribute oxygen demand materials for New River DO is also low in part due to because implementation measures in practice for the New River Sedimentation/Siltation TMDL decrease transport of organic matter to the drains. For instance, wheat filter strips (Figure 3.5) are an effective agricultural management practice that lowers organic matter as well as total suspended solids (TSSs) in tailwater. This low potential of agricultural runoff to impact New River DO levels appears to be supported by recent data (IID, 2007) from two main and seven minor agricultural drains

in the New River Watershed near the outflow to the New River. Sampling results reveal high DO levels (Table 3.1 and Appendix C).

Table 3.1: DO in the Agricultural Drains in the New River Watershed. Average (monthly and/or quarterly) from February 2004 to September 2007 by Sample Site (IID, 2007).

Sample Site	Drain Category	DO (mg/L)
Greeson	Main	7.60
Rice 3	Main	8.72
Fig	Minor Group # 1	8.06
Rice	Minor Group # 1	9.08
North Central	Minor Group # 1	7.53
Spruce	Minor Group # 2	9.57
Timothy 2	Minor Group # 2	8.89
Trifolium 10	Minor Group # 2	8.65
Trifolium 1	Minor Group # 2	8.68

Figure 3.4: Map of Main Sources of Water to the New Rive Inside the U.S. (Imperial Irrigation District Drain Water Quality Improvement Plan Drain Map)

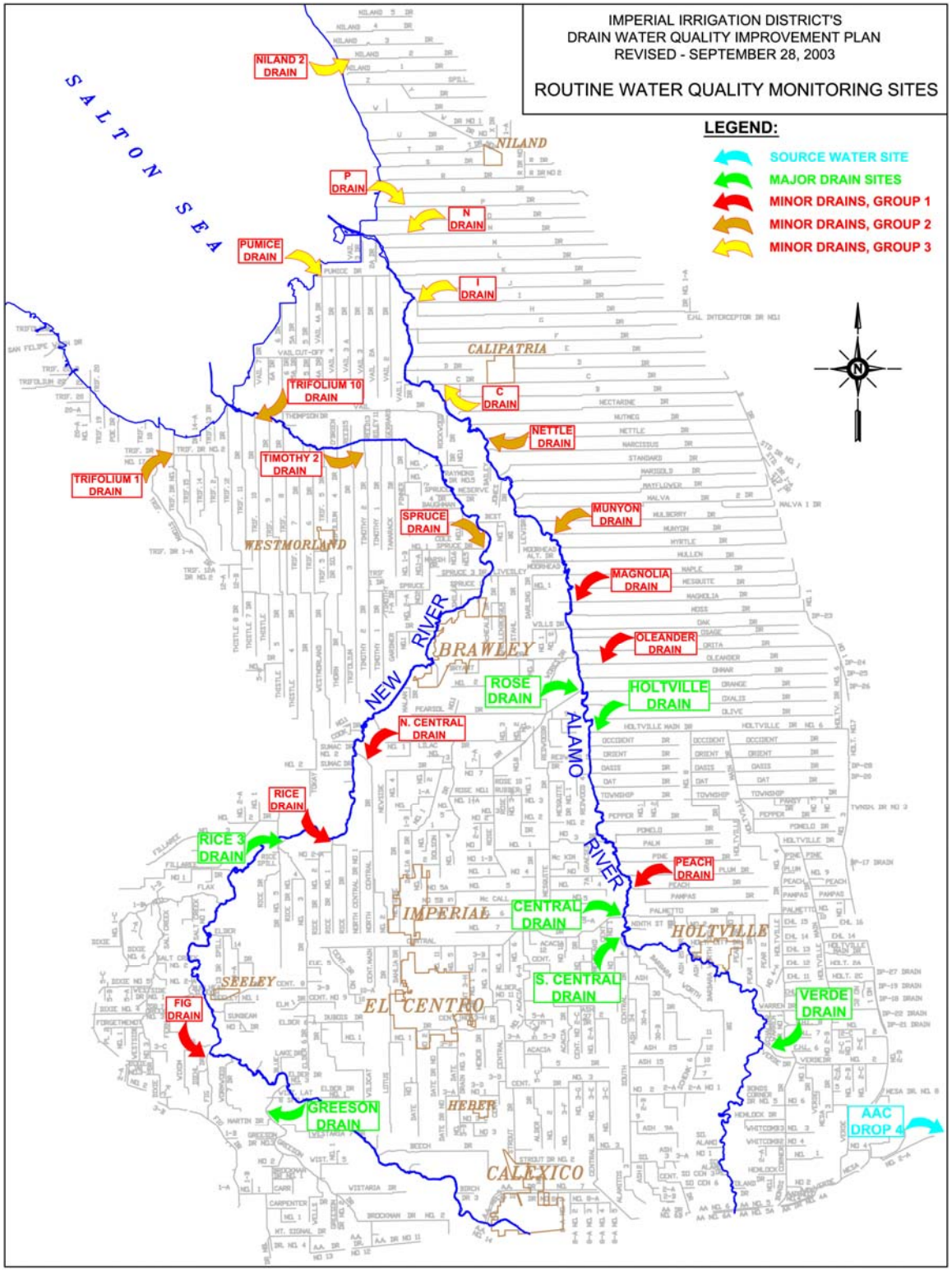


Figure 3.5: Wheat Filter Strip Management Practice

Natural Sources

Natural sources of organic matter and plant nutrients include wildlife, wind deposition, and in-stream erosion. Natural sources may contribute oxygen demand matter directly into the river, or indirectly through discharges to tributary drains. Turtles, birds, and other wildlife, use farmland for sustenance, particularly farmland with grain crops. However, the amount of oxygen demand they contribute to the river appears insignificant relative to other sources from the U.S. and Mexico. Characterizing natural sources of oxygen demand will be extremely difficult until the high levels of BOD in the river at the International Boundary are significantly reduced.

3.4: POINT SOURCES IN THE U.S.

Urban Runoff

Urban Runoff includes those discharges from residential, commercial, industrial, and construction areas within the Permit Area and excludes discharges from feedlots, dairies, farms, POTWs, and open space. Urban Runoff discharges consist of storm water and non-storm water surface runoff from drainage sub-areas with various, often mixed, land uses within all of the hydrologic drainage areas that discharge into the Waters of the United States. Urban runoff drains directly into the New River or its tributary drains.

Westmorland, Calexico, and the unincorporated community of Seeley do not have community-wide urban runoff collection and conveyance systems. However, several

public places have such systems, including: (a) Calexico Airport, which discharges directly into the New River, (b) City of Brawley, which discharges 50% to the New River and 50% to the City of Brawley WWTP (Phone Conversation with WWTP Personnel, 2008), and (c) Naval Air Facility at El Centro, which discharges to the New River (Phone Conversation with Naval Air Facility Personnel, 2000).

Urban runoff may possess an oxygen demand, but it is more likely to evaporate or infiltrate in Imperial Valley rather than drain into the New River, given the arid climate and lack of development (less than 0.5% of the New River watershed is urbanized). Similar to stormwater, urban runoff is not a potentially significant source of oxygen demand for New River DO resources.

Stormwater runoff results from intense storm events that often cause large-scale erosion in vulnerable areas. Most stormwater runoff draining into the New River is from farmland, public roads, construction activities, and residential communities. Intense storm events are uncommon, as the area has an annual average precipitation of only 2.5 inches. Stormwater runoff from Imperial Valley accounted for less than 0.8% of the flow to the New River from 1994 to 1999 (California Regional Water Quality Control Board, Colorado River Basin Region, 2001). Most runoff percolates into the ground, evaporates, or collects in community sewers for treatment at WWTPs. Stormwater runoff is not a relatively the most significant source of oxygen demand, unless it contacts manure fertilizer.

Imperial Valley municipalities and the County of Imperial are enrolled under the SWRCB Water Quality Order No. 2003 – 0005 – DWQ, NPDES General Permit No. CAS000004, Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4). Their permit is posted at the SWRCB website. The city of Calexico permit is pending and expected date for submittal to SWRCB is December 2008.

In addition to Urban Runoff, the MS4s receive flows from agricultural activities, open space, state and federal properties and other non-urban land uses not under the control of the Permittees. The Permittees lack legal jurisdiction over storm water discharges into their respective MS4s from agricultural activities, California and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board. The Regional Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges.

NPDES Facilities

In addition to the water coming from agricultural drains in the Imperial Valley, six wastewater treatment facilities discharge pollutants into the impaired section of the New River pursuant to the National Pollutant Discharge Elimination System (NPDES) program. Discharger data for the six NPDES WWTPs is described in Appendix D.

Table 3.2 lists BOD effluent limitations for the six NPDES WWTPs discharging into the impaired section of the New River. DO effluent limitations for the six facilities require that their discharges shall not cause the concentration of DO in the New River to fall below 5.0 mg/l. When the DO in the New River is already below 5 mg/l, the discharge shall not

cause any further depression. Average flow, DO, BOD, and NH_3 data for these NPDES facilities is shown in Table 3.3 and Appendix D.

Table 3.2: Current NPDES Permitted Effluent Limitations for BOD

Discharger	BOD 30 day (mg/L)	BOD 7 day (mg/L)	Facility Design Flow MGD	Permit Numbers
City of Calexico WWTP	30	45	4.3	CA7000009
Seeley County Water District	45	65	0.25	CA0105023
Centinela State Prison	45	65	0.73	CA7000001
U.S. Navy Facility, El Centro	30	45	0.3	CA0104906
Date Gardens Mobile Home Park	30	45	0.021	CA0104841
McCabe Union School District	30	45	0.015	CA0104281

Table 3.3: Average Effluent Flow, BOD, DO, and NH_3 for NPDES Permitted Facilities Discharging to the Impaired Section of the New River (2004-2007)

Discharger	NPDES Permit Number	Flow (mgd)	BOD (mg/l)	DO (mg/l)	NH_3 (mg/l)
City of Calexico WWTP	CA7000009	2.552	21.01	5.20	4.09
Seeley County Water District	CA0105023	0.081	22.50	8.53	10.90
Date Gardens Mobile Home Park	CA0104841	0.0103	6.7	NA	NA
McCabe Union School District	CA0104281	0.0035	4.39	4.96	4.66
Centinela State Prison	CA7000001	0.754	23.83	8.75	0.82
U.S. Navy Facility, El Centro	CA0104906	0.127	4.15		0.83

CAFOs

As defined in 40 CFR 122 Appendix B, the USEPA designates a CAFO if more than 1,000 “animal units”1 are confined at the facility or if the facility contains 301-1,000 animal units and it also meets one of the following specific criteria addressing the method of discharge; pollutants are discharged into waters of the United States through a man made ditch, flushing system, or other similar man made device and/or pollutants are discharged directly into waters of the Untied States that originate outside of the facility and pass over, across, or through the facility or otherwise come into contact with the confined animals. Nine CAFOs occur in the U.S. portion of the New River watershed that are regulated by Board Order No. 01-800 (General NPDES Permit and General Waste Discharge Requirements for CAFOs). Table 2.4 provides information for these CAFOs, including their relative threat to water quality. These CAFOs are prohibited from discharging directly into the agricultural drains and New River.

CAFOs are known sources of organic matter that may contaminate ground and surface waters via groundwater infiltration and conveyance, or stormwater runoff (Nishida, 2001). Groundwater infiltration and conveyance is the likely route in the case of the New River, given the low rainfall in Imperial Valley. However, CAFOs along the New River have retention basins designed to retain runoff from a 24-hour storm event with a 25-year return frequency, and berms to prevent runoff from leaving these facilities. These physical structures, together with an arid climate and low permeability soils common in the valley diminish the potential that discharges from these facilities would exert a demand for in-stream DO, depleting New River DO resources.

Table 3.4: Confined Animal Feeding Operations in the New River Watershed

Site, Address, and Map Reference Number	Maximum Number of Animals Confined	Distance to the New River or a Tributary	Threat to New River[1]
Brandenburg Feed Yard 903 West Highway 98, Calexico, 1	4,000	Adjacent to Greeson Drain	Moderate
New River Cattle 420 West Kubler Road, Calexico, 2	10,000	Adjacent to New River	High
Phillips Cattle Co. 910 Nichols Road, El Centro, 3	15,000	Adjacent to New River	High
Meloland Cattle Co. 907 Brockman Road, El Centro, 4	16,000	Adjacent to Wisteria Drain	Moderate
Jackson Feedlot 495 West Heber Road, El Centro, 5	15,000	1.5 miles	Low
El Toro Land and Cattle Co. 96 East Fawcett Road, Heber, 6	16,000	2 miles	Low
Kuhn Farms Dairy 1870 Jeffery Road, El Centro, 7	10,000	Adjacent to Dixie Drain #4	Moderate
Cameiro Heifer Ranch 195 West Corey Road, Brawley, 8	8,000	2 miles	Low
Ruegger and Ruegger Feedlot 604 Bannister Road, Westmorland, 9	2,500	Adjacent to Timothy Drain	Moderate

[1] Threat estimates are based on site size and proximity to surface water.

3.5: RECOMMENDED ACTIVITIES FOR REFINEMENT OF SOURCE ANALYSIS

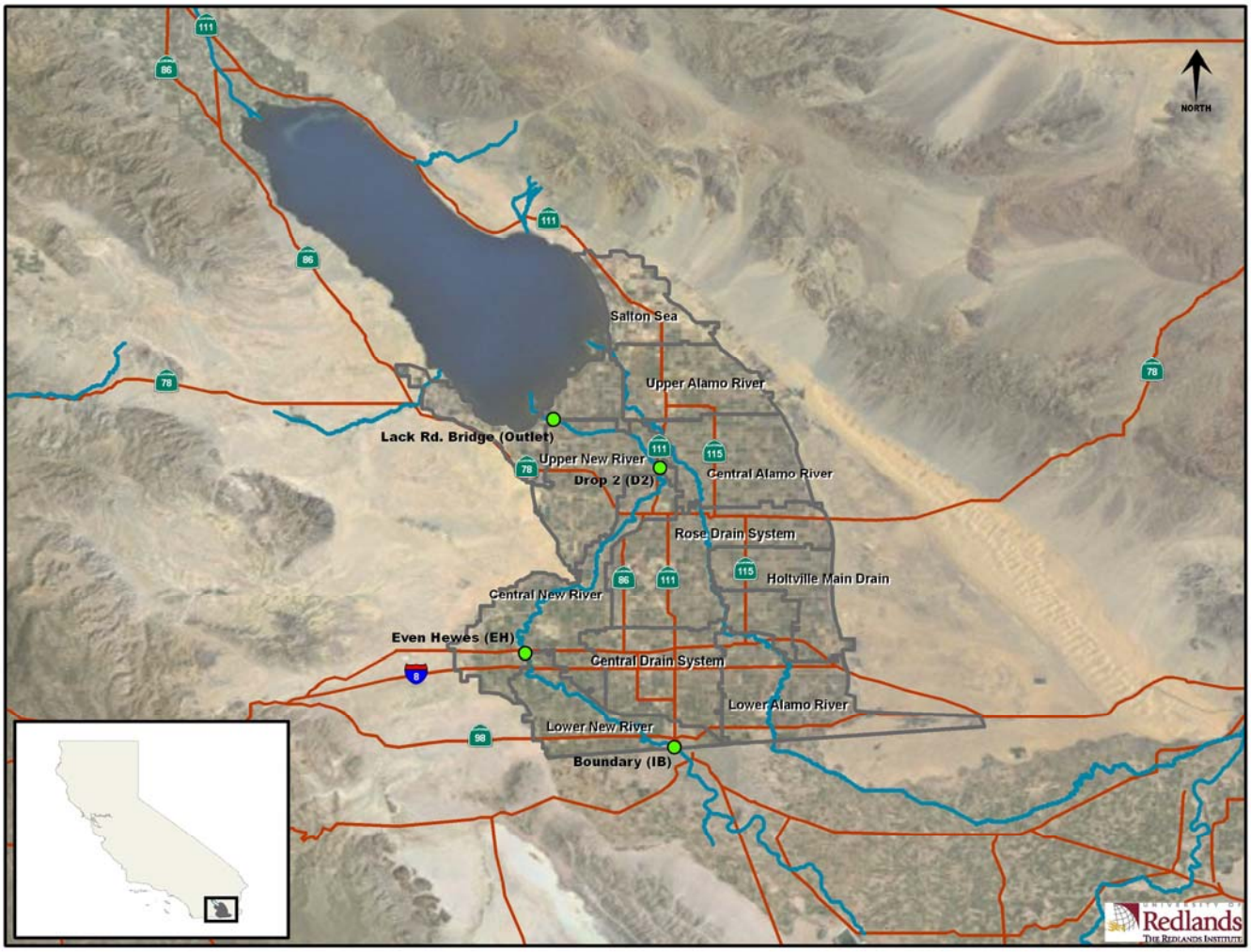
High levels of oxygen demand materials have negative impacts on water quality and aquatic life in the New River (Setmire, 1984). A continuous monitoring program at various locations along the New River in Imperial Valley is needed to characterize the magnitude of the DO impairment and the effect of Las Arenitas WWTP in the New River Watershed. Monitoring is part of the Implementation Plan for this TMDL, and will be used to refine the TMDL, if needed.

CHAPTER 4: DATA ANALYSIS

Development of this TMDL started early 2003. Regional Board staff collected monthly water quality samples at four locations in the New River, from March 2003 to May 2008, to evaluate DO impairments (Figure 4.1). The four sampling locations are:

- New River at the International Boundary (IB);
- Evan Hewes Highway (EH), about 20 river miles downstream from IB;
- Drop Structure 2 (D2), about 50 river miles downstream from IB; and
- Outlet to the Salton Sea (Outlet), about 60 river miles downstream from IB.

Figure 4.1: Map of Regional Board New River TMDL Sampling Locations



More water quality and flow data were obtained from other sources including the Regional Water Quality Control Board (Regional Board) Border Program, U.S.

International Boundary and Water Commission (USIBWC), U.S. Geological Survey (USGS), Imperial Irrigation District (IID), and wastewater treatment plants (WWTPs) in the New River watershed inside the U.S.

4.1: FLOW DATA

Tables 4.1 and 4.2, and Figure 4.2 show New River flows at two locations (International Boundary and Outlet to the Salton Sea) from January 2004 to September 2008, as reported by the USGS. In 2007, flow at the International Boundary was about 125 cfs and at the outlet into the Salton Sea was about 574 cfs. Flows from Mexico have been decreasing over the years.

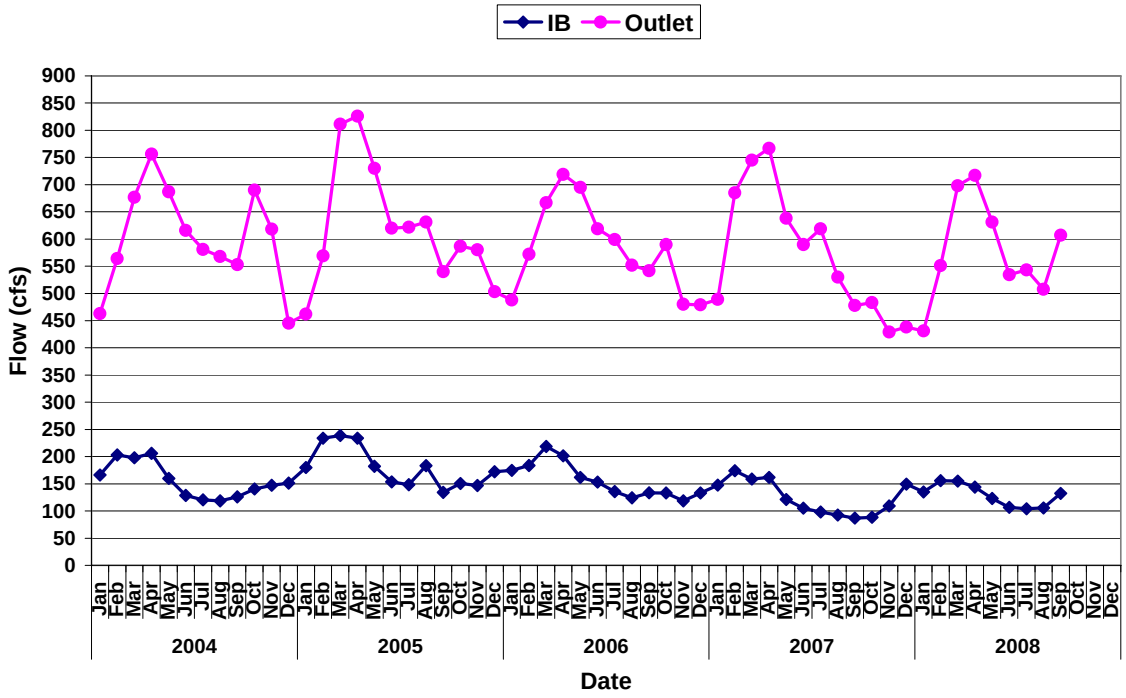
Table 4.1: Flow in New River at the International Boundary – January 2004 through September 2008 – Station 10254970. USGS Monitoring Program.

	Monthly Mean Discharge (cfs)				
MONTH	**2004**	**2005**	**2006**	**2007**	**2008**
Jan	166.2	179.9	174.9	147.7	135
Feb	203.2	233.9	183.7	174.0	156
Mar	197.9	238.8	218.5	158.9	155
Apr	206.2	233.9	201.5	161.6	144
May	160.0	182.3	161.8	121.4	123
Jun	128.8	153.6	153.1	105.4	106.8
Jul	120.6	148.3	135.8	098.0	104.2
Aug	118.5	183.2	124.1	092.7	105.8
Sep	126.2	134.3	133.4	087.0	132.5
Oct	140.4	150.5	133.3	088.6	
Nov	147.2	147.0	118.7	109.4	
Dec	151.2	172.3	133.3	149.5	
MEAN	**155.5**	**179.8**	**156.0**	**124.5**	

Table 4.2: Flow in New River at the Salton Sea Outlet – January 2004 through May 2008 – Station 10255550. USGS Monitoring Program.

	Monthly Mean Discharge (cfs)				
MONTH	**2004**	**2005**	**2006**	**2007**	**2008**
Jan	463	462	488	489	431
Feb	564	569	572	685	551
Mar	677	811	667	745	698
Apr	756	826	719	767	717
May	687	730	695	638	631
Jun	616	620	619	590	534.6
Jul	581	622	599	619	543.5
Aug	568	631	552	530	507.7
Sep	553	540	542	478	607
Oct	690	587	590	483	
Nov	618	580	480	429	
Dec	445	503	479	438	
MEAN	**602**	**623**	**584**	**574**	

Figure 4.2: Averga Monthly Flows for New River at IB and Outlet



4.2: WATER QUALITY DATA

Regional Board TMDL DO data for the four sampling locations from 2003 to May 2008 are described in Figures 4.2, Table 4.3, and Appendix E. Regional Board Border Program DO data for the New River at the International Boundary from 1997 to March 2008 can be viewed at:

http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/new_river/dataindex.shtml

DO annual average for the New River at the International Boundary increased from 0.68 mg/l in 2003 to 3.48 mg/l in 2007. As a result, DO annual average for the New River at Evan Hewes Highway increased from 1.76 mg/l in 2003 to 3.55 mg/l in 2007. These observations indicates that the New River still violates the minimum 5 mg/l DO WQO at any time.

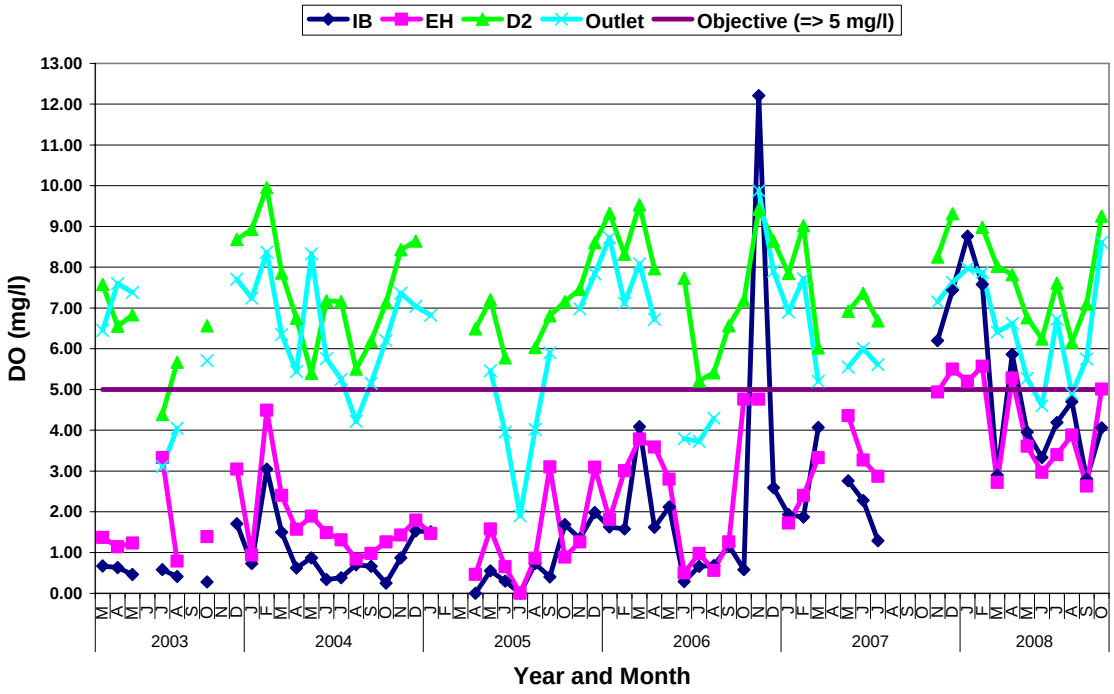
Data analysis indicates that increased DO levels for the impaired section of the New River for 2007 and 2008 are attributed to the Las Arenitas WWTP. The data also confirms that discharges from Mexico have a major influence on DO levels in the impaired section of the New River. Proper operation and maintenance of the Las Arenitas WWTP is critical to addressing New River low DO impairment. Increasing DO

concentrations in the New River to a minimum of 5 mg/l at any time is the goal of this TMDL. More water quality data will be collected to determine progress towards reaching TMDL goals.

Table 4.3: New River annual averages of DO (mg/l) from 2003 to 2007

	DO (mg/l)			
YEAR	UPSTREAM →			DOWNSTREAM
	Border	Evan Hewes	Drop 2	Outlet
2003	0.68	1.76	6.61	6.00
2004	0.96	1.70	7.43	6.39
2005	0.85	1.34	6.94	5.36
2006	2.44	2.53	7.75	6.69
2007	3.48	3.55	7.68	6.47

Figure 4.2: Monthly DO for the New River at 4 Locations from March 2003 to Date



CHAPTER 5: CRITICAL CONDITIONS AND SEASONAL VARIATIONS

Critical conditions are the set of environmental factors identified that must be taken into account to ensure attainment of WQOs under varying conditions. One typical critical condition is the time of year (season) that the water body is most vulnerable, which is often due to changes in climate or land usage.

New River climate is hot, with warm winters, dry summers, occasional thunderstorms, and sandstorms with gusty high winds. The area is one of the most arid in the U.S., with an average annual rainfall of three inches and temperatures in excess of 100ºF over one hundred days of the year. Average temperature is 54 ºF in January and 92 ºF in July. Evapotranspiration rates may exceed 84 inches per year, and one-third inch per day in hot summer months.

Flow in the New River is lowest in winter when less water is diverted into the canals due to decreased temperatures and evapotranspiration, and reduced irrigation. Flows from Mexico have been decreasing over the years due to increasing consumption of water, consumption of waste water by power plants, water transfer to other cities in Baja California, and diversion of treated wastewater to a different watershed.

Land usage in the vicinity of the New River in Mexico is a combination of agricultural, industrial, and municipal. Currently, average discharge of treated wastewater flow from Mexicali to the New River is about 25 mgd or 38.7 cfs. Average discharge from agricultural and industrial flow in the Mexicali Valley to the New River via agricultural tributary drains for the year 2007 was about 85.8 cfs, which is the result of total flow at the International Boundary (124.5 cfs from Table 4.1, above) minus municipal flow**.** Agricultural discharges vary depending on the time of year, with decreased flows in winter due to decreased irrigation. Winter months may see an increase in contaminant concentrations (e.g., bacteria, oil, chemicals) in the New River downstream of the International Boundary due to the reduced flow.

Prior to the completion of Las Arenitas WWTP, there was no significant critical condition/ seasonality for DO in the impaired section of the New River. Data showed year-round violations of DO WQOs immediately downstream of the International Boundary, regardless of season or climate (Appendix F).

DO seasonal variations for the New River at four locations from 2003 to date is shown in Figures 5.1 to 5.4. Analysis of data suggests improved concentrations of DO in the impaired section of the New River although the concentrations still violate the minimum 5 mg/l DO WQO. Because the materials that cause low DO may stay in the New River for few months, controlling these materials throughout the year is important.

Figure 5.1: Seasonal Variation of DO for New River at IB

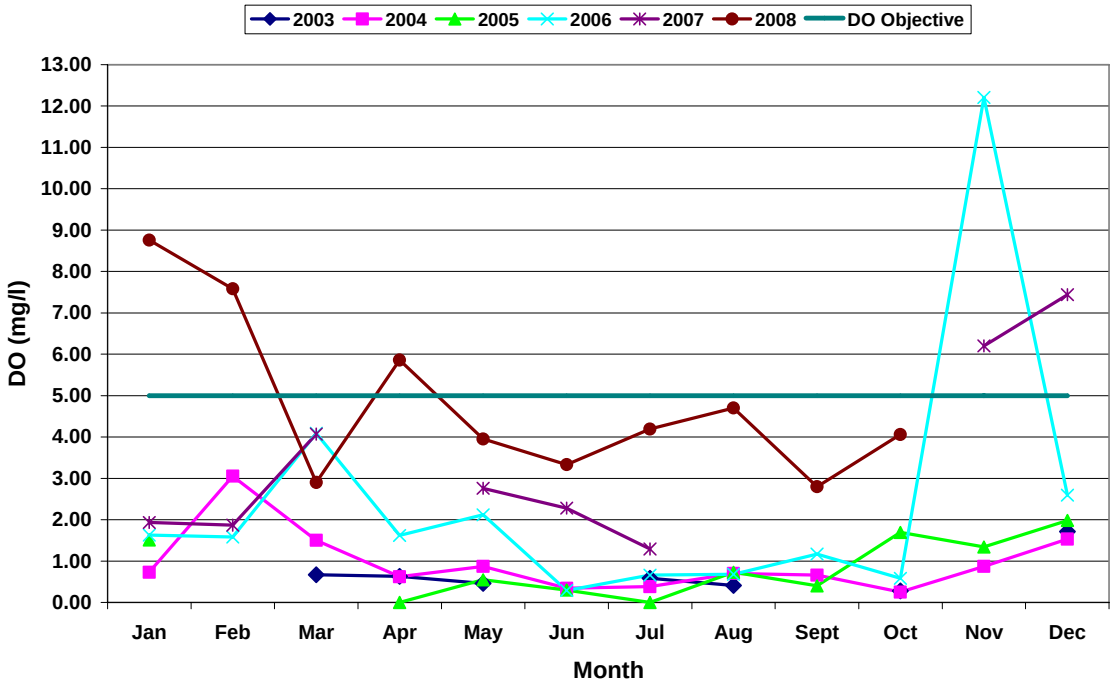


Figure 5.2: Seasonal Variation of DO for New River at EH

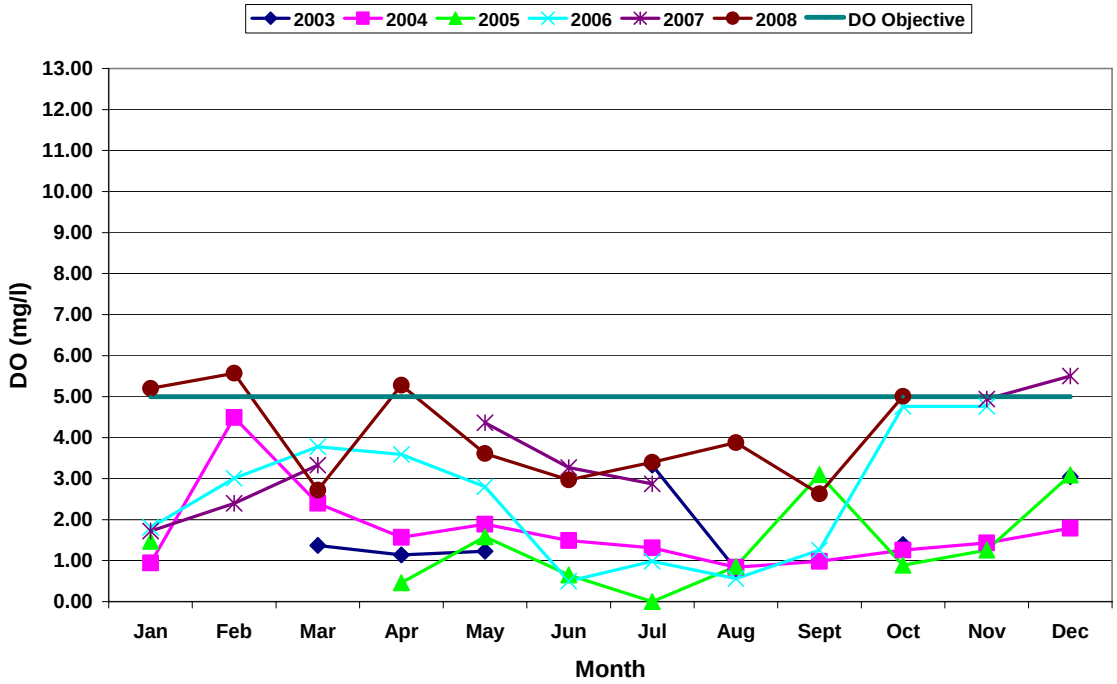


Figure 5.3: Seasonal Variation of DO for New River at D2

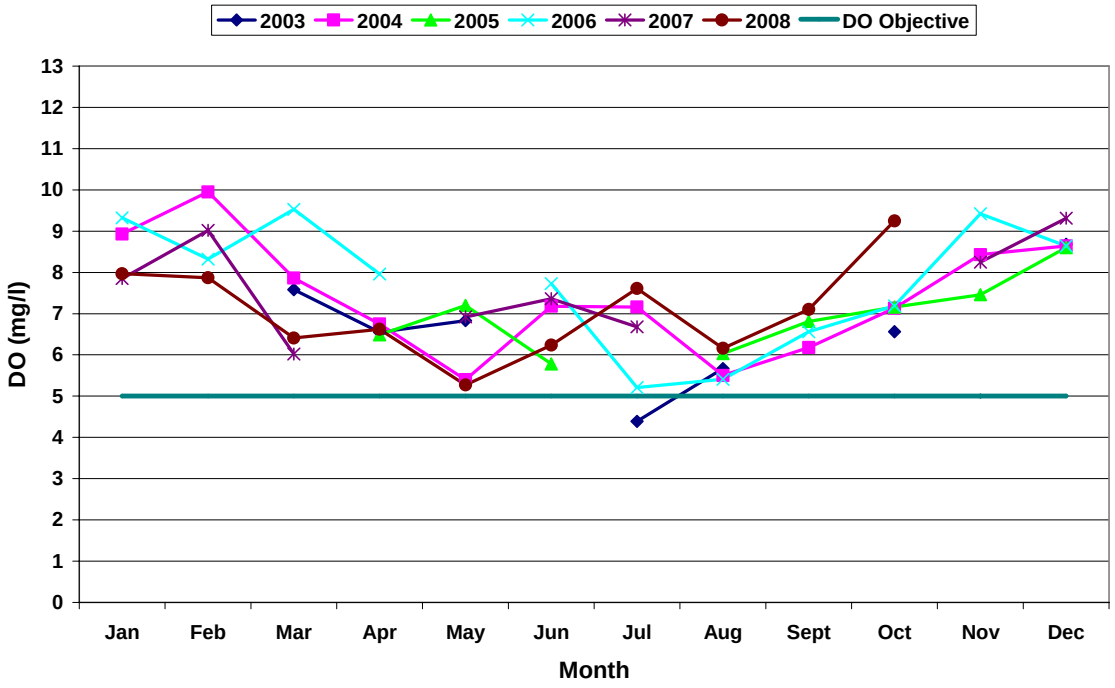
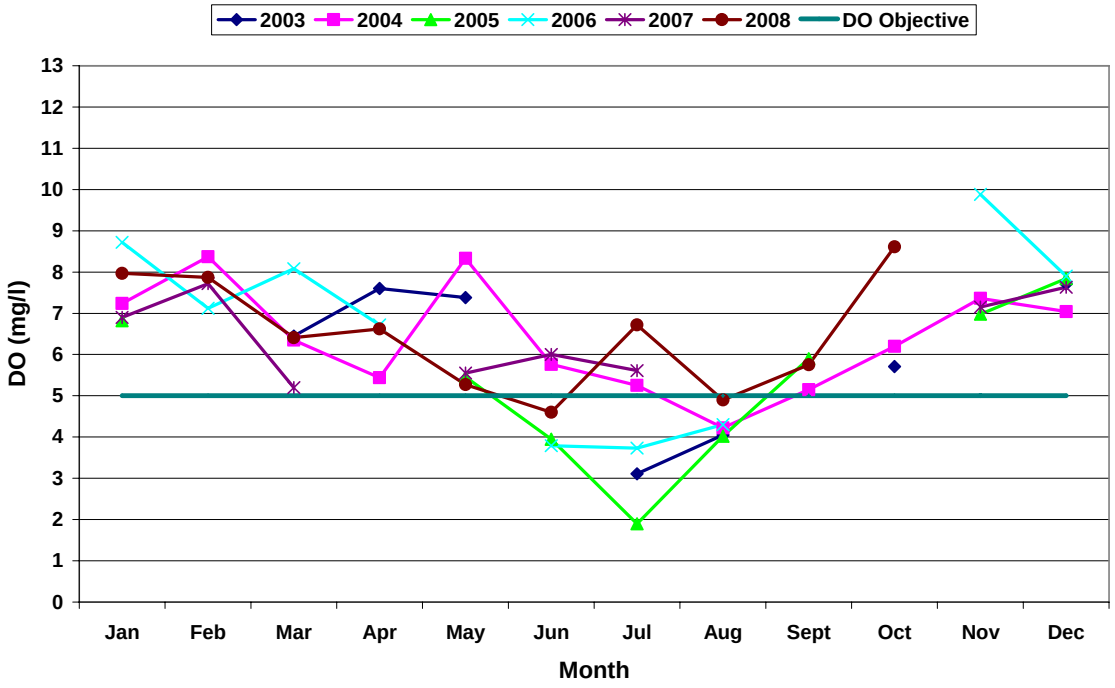


Figure 5.4: Seasonal Variation of DO for New River at Outlet



CHAPTER 6: NUMERIC TARGET

This Chapter describes the numeric targets that will be used to meet WQO for DO and protect New River beneficial uses. Low DO levels threaten fish and wildlife communities and prevent the establishment of a healthy ecosystem. Most fish species in warmwater streams require a minimum of 5 mg/l DO for optimum health. The proposed numeric target for this TMDL is contained in the Basin Plan. The DO numeric target is specified in Table 6.1.

Table 6.1: New River DO Numeric Target

Indicator	Numeric Target Value
Dissolved Oxygen (DO)	Greater than or equal to 5.0 mg/l at any time

TMDL target is applicable throughout the year for the entire stretch of the New River. Achieving this numeric target is expected to protect the New River beneficial uses.

The numeric target takes into account that the New River is a warm water system, and protects the most sensitive organisms, particularly during their early vulnerable life stages. Warm water streams are generally muddy with silt and sandy bottoms, and more turbid than coldwater streams (Waters, 1995).

BASIS FOR NUMERIC TARGET

DO is a measure of free available oxygen within a water body, and is necessary for aquatic life. The USEPA has established water quality criteria for warmwater to protect aquatic life (Table 6.1), particularly during the initial life stages.

Table 6.1: Water quality criteria for ambient DO concentration (mg/L)

Method	Warm Water Criteria	
	Early Life Stages[a]	Other Life Stages
30 Day Mean	NA	5.5
7 Day Mean	6.0	NA
7 Day Mean Minimum	NA	4.0
1 Day Minimum[b]	5.0	3.0
a Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching. b All minima should be considered as instantaneous concentrations to be achieved at all times.		
Source: adapted from USEPA, 1986		

The oxygen content in a river is a function of oxygen sources and sinks. Sources for oxygen in the New River include:

- Re-aeration through agitation at drop structures;

- Photosynthesis;
- A decrease in temperature which increases the oxygen saturation potential and decreases microbial activity,; and
- Dilutions from drain discharges.

The sinks for oxygen in the New River include:

- Decomposition of organic matter;
- An increase in temperature, which causes oxygen vapor loss and increased microbial metabolism;
- Respiration by fish and other aquatic organisms; and
- An increase in salinity, which decreases oxygen solubility.

Waters with low DO often have foul odors from waste products generated by organisms living in low oxygen environments. Very low levels of DO may mobilize (i.e., dissolve) trace metals.

DO LEVELS IN THE NEW RIVER RELATIVE TO NUMERIC TARGET

Four sites were evaluated for DO in the New River from 2003 to May 2008 (Figure 4.1). DO levels vary among these sites, with the International Boundary and Evan Hewes Highway reporting DO concentration significantly below the numeric target, especially during the warm months (Appendix E).

CHAPTER 7: LINKAGE ANALYSIS AND ALLOCATIONS

This Chapter establishes a connection between numeric targets and load allocations, and the protection of beneficial uses in the New River first 12 mile reach downstream of the International Boundary. The relationship between source loading and the assimilative capacity of the New River at International Boundary also is addressed. In addition, this Chapter identifies New River at International Boundary DO TMDL allocations for point, nonpoint, and background sources required to attain WQSs..

A water quality model was also used to evaluate the sources of materials causing the New River DO impairment, and to determine loads that the New River can receive without violating its applicable WQSs for DO. The data and modeling analysis showed that Mexico's sources are the major cause of low DO in the New River. Load allocations recommended by the New River QUAL2K Water Quality Model (see discussion below) for Mexico will be implemented first. As more New River water quality data is collected and evaluated, allocated loads will be revised, if necessary.

7.1: DISCUSSION OF NEW RIVER QUAL2K MODEL

Tetra Tech Inc. developed the steady-state New River QUAL2K Water Quality Model (Model) for the USEPA Region 9, San Francisco, California. The purpose of the Model was to assist Regional Board staff on Data and Source Analysis, Linkage Analysis, and Load Allocations in terms of parameters that cause low DO such as BOD and NH_3 (Appendix F). The use of the Model can help estimate and predict DO concentrations along various locations of the New River at which monitoring data is not collected.

Steady-state models are applied for "critical" environmental conditions that represent extremely low assimilative capacity. For discharges to riverine systems, critical environmental conditions correspond to lower upstream flows. The assumption behind steady-state modeling is that protection of water quality during critical conditions will be protective for the large majority of environmental conditions that occur. For this model, only lower flow conditions were evaluated to determine the assimilative capacity of New River for oxygen demanding materials because this represents the critical conditions. BOD and NH_3 expressed as mass per time were chosen because the modeling showed BOD and NH_3 are the most influential parameters affecting DO levels in the New River and variations in other parameters were shown to have only a minor influence.

First priority in model calibration was the determination of temperature, DO, carbonaceous BOD, and NH_3. The second priority was the consideration of other nutrients, conductivity, suspended solids, alkalinity and pH. Phytoplankton, detritus, and pathogens were not calibrated due to limited data.

The Model concentrated on the critical condition months of June, July and August where lower flow and higher temperature are characteristic. Calibration of the QUAL2K Model was completed for the study date of July 17, 2006, which corresponded to a critical conditions of 30.5 °C headwaters temperature. Validation was performed for additional conditions occurring in June 2006 at a headwaters temperature of 28.5 °C.

TMDL scenarios were evaluated by Tetra Tech Inc., USEPA, and Regional Board: (1) to measure the potential improvement based on the Las Arenitas WWTP diversion of wastewater flows out of the New River basin upstream of the International Boundary, and (2) to meet the water quality objective of a minimum of 5.0 mg/l DO at all times (Appendix F). Not all of the modeling scenarios discussed in the Tetratech report in Appendix F are applicable to this TMDL. The "current conditions" scenario in the Tetratech report is outdated, and the "Future II" scenario does not reflect the Regional Board assumptions of future flows. Rather, the "Future I" scenario in the report reflects current critical conditions, with the exception of the Regional Board use of 100 cfs as the appropriate flow rate and DO of 1.25 mg/L. These are the values recently observed in the critical months of lower flow.

Reduced BOD and improved DO at the International Boundary have resulted in improved conditions in the New River formerly exhibiting DO in the range of 0-1 mg/L for 20 miles downstream of the International Boundary. However, DO is projected to remain between 1-2 mg/L in this reach during critical conditions. In order to meet the water quality objective of 5.0 mg/L at all times throughout the New River first 12 mile reach downstream of the International Boundary, additional improvements would be necessary in water quality at the International Boundary.

Overall Approach

The overall approach is to model the existing BOD, DO, and NH_3 loads utilizing the New River QUAL2K Water Quality computer Model, and then reduce loads of BOD and NH_3 loads until the WQO DO is met. For BOD and NH_3 the load will be set through consideration of the observed relationships with DO as well as the simulated natural pre-developed conditions.

TMDL Model Current Critical Conditions Scenario

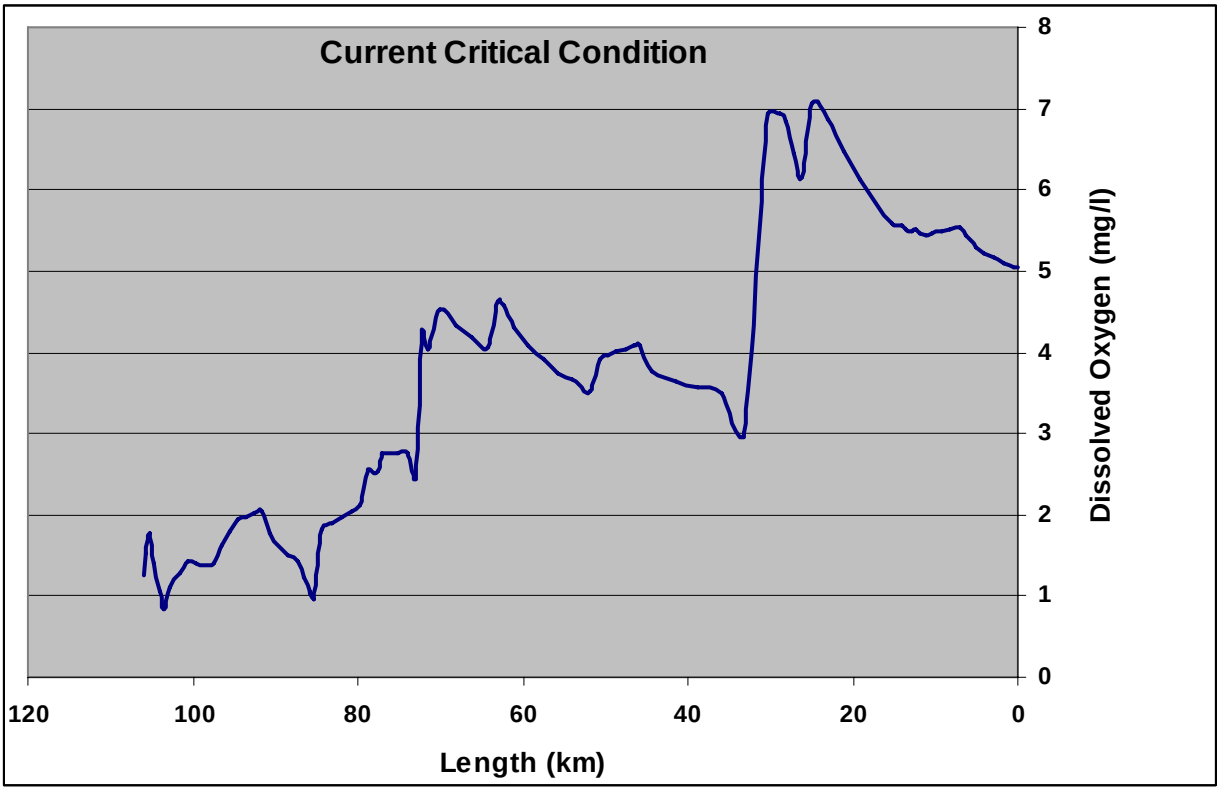
Figure 7.1 shows Model current critical conditions, with the following assumptions:

<u>Baseline assumptions at International Boundary:</u>

Flow Rate = 2.832 m^3/sec (100 cfs) (based on July 2007 data)
DO = 1.25 mg/L
BOD = 19.5 mg/L
NH_3= 4,650 ug N/L or 4.65 mg/L

Length 105 km on Figure 7.1 represents the New River at the International Boundary and length 0 km represents New River at outlet into the Salton Sea.

Figure 7.1: Current Critical Conditions Based on the Model



DO is generally between 1 and 2 mg/l for the first 25 kilometers (kms). DO levels increase to between 3 and 4 mg/l for the next 50 kms. For the remaining 30 kms to the Salton Sea, DO is above 5 mg/l and is therefore attaining the standard. DO levels downstream reflect organic matter decay, and dilution from agricultural return flows. The modeling shows the major influence in the impaired portion of New River is the International Boundary inflow.

Current Conditions

Preliminary results of monitoring the New River at the International Boundary indicate that measurable water quality improvements have been achieved with implementation of Las Arenitas WWTP (Figures 4.2, 4.3 and Appendix E). The level of DO increases significantly as the New River travels 60 miles from the International Boundary to its terminus at the Salton Sea. Several factors account for the increase in DO including bacteria die-off, seepage, and dilution from treated WWTP effluent discharges, and agricultural flows (tailwater and tilewater).

In addition, an aeration structure located 500 feet downstream of Evan Hewes Highway, and three weirs north of Brawley constructed for erosion control, rapidly mix and re-oxygenate the New River, thereby increasing DO and the assimilative capacity for organic matter (Setmire 1984).

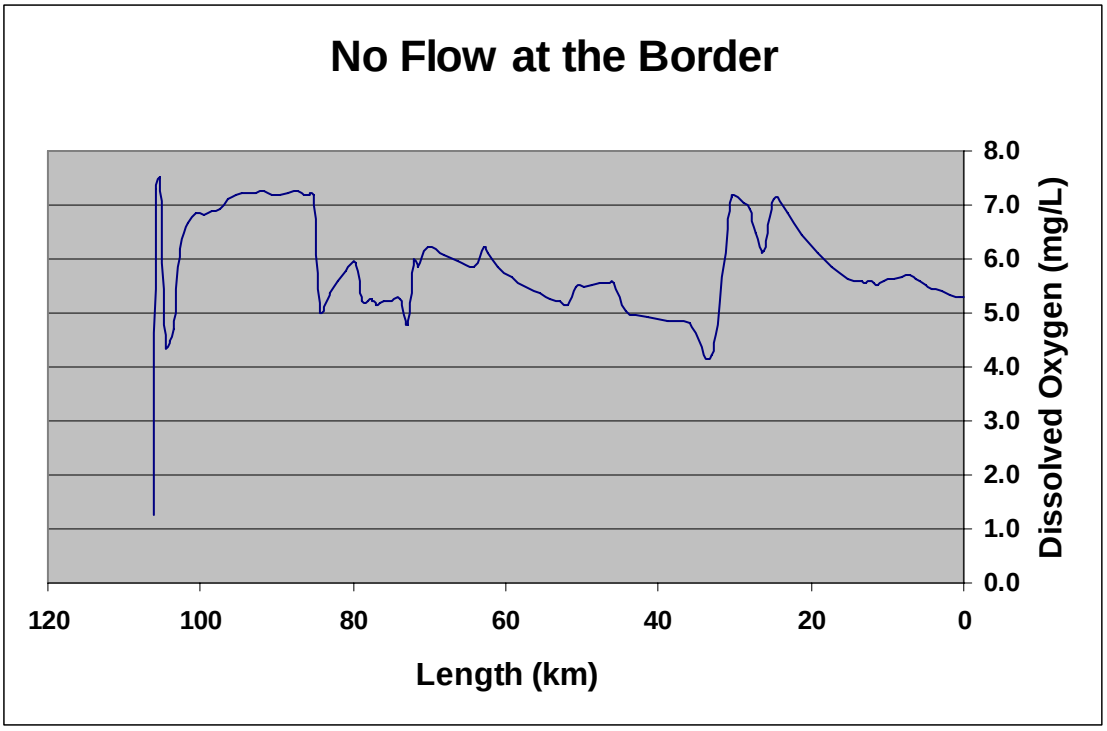
Model with No Mexican Flow Scenario

In order to test the influence of Mexican discharge on DO in the New River, flow at the border is reduced to zero in this modeling scenario (Figure 7.2). The "no flow from Mexico" scenario would reduce 21.7% of flow into the New River.

Baseline Assumptions:

- Flow rate for New River at International Boundary reduced to zero

Figure 7.2: Model DO Levels with No Flow from Mexico Scenario



Length 105 km on Figure 7.2 represents the New River at the International Boundary and length 0 km represents New River at outlet into the Salton Sea.

Figure 7.2 shows that reducing flow from Mexico to near zero will result in DO standard being attained in the New River with the exception of three locations (totaling 13.5 kms), in which DO drops to below 5 but remains above 4.

7.2: LINKAGE ANALYSIS

DO is not a pollutant; therefore, the TMDL targets parameters causing low DO. The causative pollutant for the low DO are BOD and NH_3. The Model shows that BOD and NH_3 are the most influential parameters affecting DO levels in the New River and

variations in other parameters have a minor influence (Appendix F). BOD represents the decomposition of organics to carbon dioxide. NH_3 is an indicator for anthropogenic eutrophication. This arises when excessive amounts of nutrients, mainly from sewage and agricultural runoff, stimulate algal growth. The increase in algal biomass subsequently leads to more organic matter sinking into the benthic water layers. Bacteria decompose the organic matter at river's bottom, consuming large amounts of oxygen.

Sewage discharges to the New River in Mexico due to inadequate sewer infrastructure prior to the Las Arenitas WWTP was the reason the New River is listed as impaired for DO at the International Boundary and for more than 20 miles downstream. Bacteria decomposers respond to the increased organic matter with increased growth, thus, increased consumption of DO. Significant bacterial die-off may occur abruptly, if the food supply (organic matter) is depleted or DO concentrations suddenly change (USEPA, 1986; Thomann and Mueller, 1987). Decomposer microorganisms may respond similarly or become dormant until favorable conditions return. While temporal variability is unknown, it is believed that a direct correlation exists between water temperature and river assimilative capacity (Pickett, 1997; USEPA, 1986; Mancini, 1978).

The assimilative capacity of the river for DO indicators (BOD, NH_3) is defined as the highest DO causative pollutant (BOD, NH_3) load that the river can assimilate without exceeding the numeric target and WQSs (40 CFR Part 130.2(f)). Therefore, assimilative capacity is based on the numeric target.

The assimilative capacity of the New River is the sum of the target and Margin Of Safety (MOS) as indicated below:

Assimilative Capacity = Target + MOS

TMDLs include a MOS to account for data uncertainty, critical conditions, lack of knowledge, and land use growth. This TMDL has an implicit MOS, which is incorporated into the conservative processes used to develop the TMDL, and is not quantified.

Therefore, assimilative capacity is based on the numeric target, which is expressed as a concentration (mg/l). To determine assimilative capacity, the numeric target concentration must be converted to pollutant load (tons/year) based on the amount of water flow, while also accounting for natural sources and a MOS. The allowable pollutant load includes load allocations, wasteload allocations, and future growth. Assimilative capacity for any time period can be expressed mathematically as:

TMDL = Assimilative Capacity = Allowable Pollutant Load + Natural Sources Load + MOS

Using the DO WQO of 5.0 mg/L as the numerical target, a TMDL Model analysis was performed at critical conditions (warmer and lower flow months) to determine the loading capacity for the watershed. This was accomplished through a series of simulations aimed at meeting the DO target limit by varying source contributions (Appendix F). The

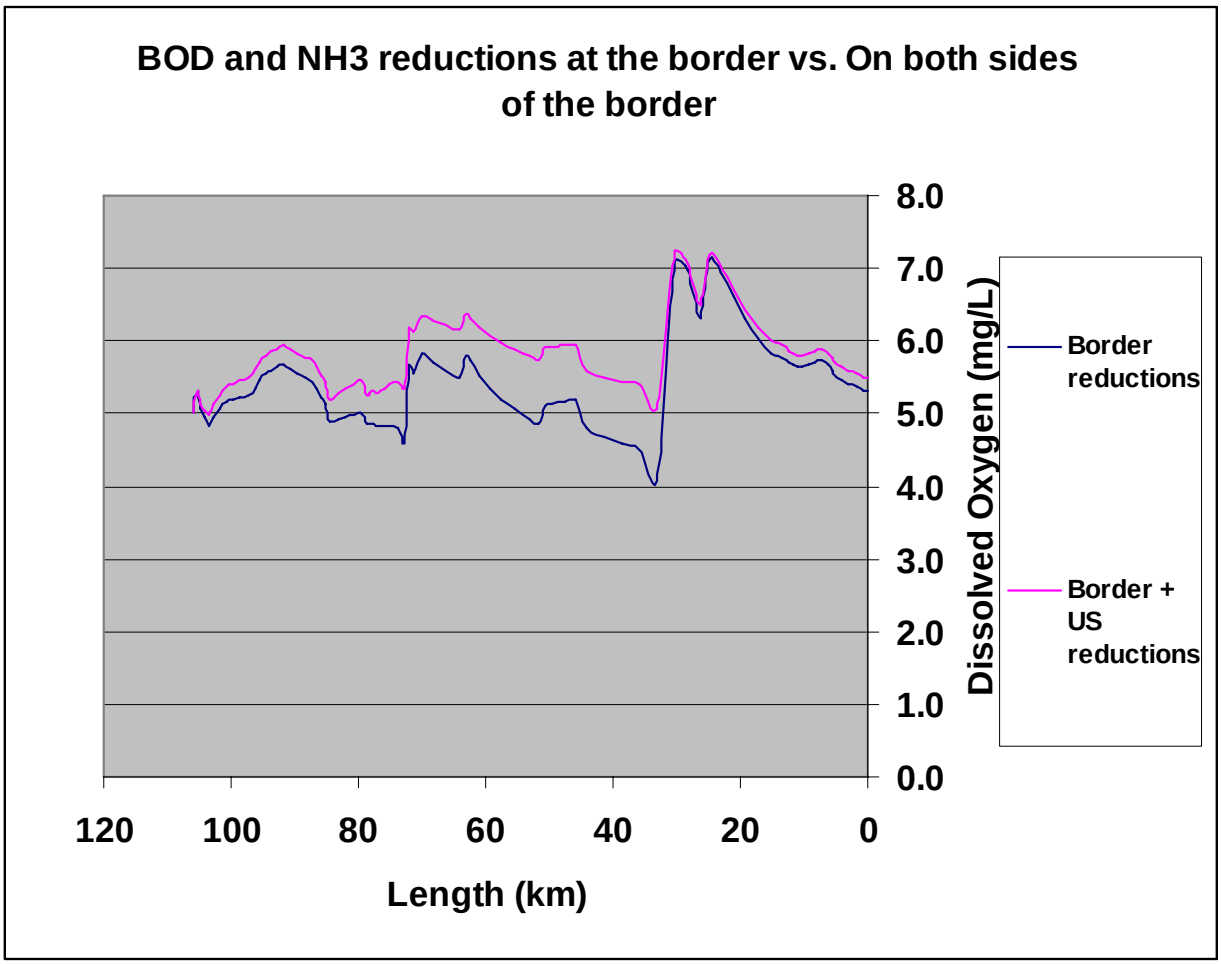
Model was used to test sensitivity and explore different combinations of Mexican vs. U.S. reductions during critical conditions for various parameters, including DO, BOD, NH3, nitrogen and phosphorous. Also, some Model scenarios involved additional or enhanced weirs on the U.S. side of the border.

In the Model analysis, pollutant concentrations were set at levels necessary to maintain DO concentrations a minimum of 5 mg/L. The model predictions for instream pollutant concentrations were then compared to actual field data, as shown in Table 7.1 and Figure 7.3, below:

Table 7.1. TMDL BOD and NH_3 Load Scenarios for Achieving DO Standard in the New River
Two scenarios: Improvements in BOD and NH_3 from Mexico's effluent (Nutrient Removal + Filtration) plus US source reductions
Baseline Assumptions: Two model simulations:
1. At International Border DO=5 mg/l, BOD=5 mg/l, NH_3=0.5 mg/l and no US source reductions
2. In addition to the above assumptions, US source reductions through N. Central Drain: 8 BOD at WWTPs and maximum 0.5 mg/L NH_3 at WWTPs and drains

These assumptions are based on New River at the International Border being treated by a Wastewater Treatment with nutrient removal with gravity filtration (National Research Council, 1993). Nitrogen removal is accomplished by an extension of the conventional biological system to incorporate the biochemical processes of nitrification and denitrification. Nitrification is the oxidation of NH_3 and organic nitrogen to nitrate nitrogen. Denitrification reduces nitrate nitrogen to nitrogen gas and releases it into the atmosphere. The combination with gravity filtration system removes additional quantities of TSS along with other contaminants associated with TSS (such as BOD, nitrogen, phosphorus). This system is used in some areas to produce water for use in urban irrigation.

Figure 7.3: TMDL BOD and NH_3 Load Scenarios for Achieving DO Standard in the New River



Length 105 km on Figure 7.3 represents the New River at the International Boundary and length 0 km represents New River at outlet into the Salton Sea.

According to the "Border Reductions" only scenario, the DO standard is attained in the New River with the exception of five locations (totaling 32.6 km) in which DO drops below 5 mg/l but remains above 4. U.S. source reductions would be needed to raise DO above 5 throughout the New River, as shown in the "Border + U.S. Reductions" scenario.

The main findings from the modeling run (Appendix F).

The modeling shows that attainment cannot be achieved through U.S. reductions alone. Even if U.S. sources of BOD and NH_3 were reduced to zero, this would have little effect on DO in the first 20 miles of the New River past the IB and would only increase DO to above 5 for approximately 19% of the estimated total 47 impaired miles. Notwithstanding, even in the most aggressive modeling scenario of future BOD and NH_3 reductions at the IB, some U.S. source reductions are still needed in order to boost DO in all locations of the New River to a minimum of 5.0 mg/l.

7.3: LOAD AND WASTELOAD ALLOCATIONS

As stated in 40 CFR 130.2, a TMDL is the sum of the wasteload and load allocations. Allocations are defined as the portion of a receiving water loading capacity that is allocated to one of its existing or future nonpoint sources of pollution (e.g., wastewater drains), point sources of pollution (e.g., WWTPs), and natural sources. These loads, along with a MOS, make up the Assimilative Capacity of the New River. The TMDL is theoretically equivalent to the Assimilative Capacity.

TMDL = Load Allocations + Wasteload Allocations + MOS + Natural Sources = Assimilative Capacity

WLAs and LAs for this TMDL are applicable to only the New River first 12 mile impaired reach immediately downstream of the International Boundary. This *impaired reach* of the New River was defined by modeling and data analysis.

7.4: SPECIFIC ALLOCATIONS BY SOURCES

The Model Scenario "Border Reductions only" in Table 7.1 and Figure 7.3 and the source analysis show that waste discharges in Mexico to the New River and tributary drains are the only source of DO impairment in the New River first 12 mile reach downstream of the International Boundary. The Model Scenario "Border Reductions only" proposes BOD and NH_3 loads for sources inside Mexico. The allowable load may not be distributed among different drains and sources because the Regional Board has no jurisdiction over waste discharges originating in Mexico. Consequently, the full allowable load can only be designated to the waste sources crossing into the U.S. at the International Boundary in Calexico.

The only source of impairment in the New River first 12 mile reach downstream of the International Boundary is flow from Mexico and it is considered nonpoint source. Therefore, this TMDL has only Load Allocations.

The TMDL DO numeric target of a minimum of 5 mg/l at any time is to be achieved within three years of USEPA approval of this DO TMDL.

Load Allocations for Mexico

The load allocations for all discharges from Mexico at the International Boundary are 5.0 mg/l or 1522.89 kg/day of BOD and 0.5 mg/l or 152.29 kg/day of NH_3 (Table 7.2).

Table 7.2: International Boundary Loading Calculation*
BOD Load
Daily Loading = Average Flow in 2007 (from Table 4.1) x BOD (from Linkage Analysis)
Daily Loading = (Flow Rate (cfs) x (conversion factor to litter per day)**) x (BOD (mg/l) x (conversion factor to kg/l)***
Daily Loading = (124.5 cfs X 2446848) (l/day)x (5 mg/l x 10^{-6}) (kg/l) = 1523.16 kg/day
NH_3 Load
Daily Loading = Average Flow in 2007 (from Table 4.1) x NH_3 (from Linkage Analysis)
Daily Loading = (124.5 cfs X 2,446,848) (l/day) X (0.5 mg/l X 10^{-6}) (kg/l) = 152.31 kg/day
* - the MOS is implicit and the rationale is explained at next page
* - one gallons (U.S) = 3.78541 litters
* - one cubic-feet = 7.48 gallons = 28.32 litters
** - conversion factor from cfs to litters per day = (1x60 seconds x60 minutes x 24 hours x 28.32 litters) = 2,446,848
*** - I (one) kg = 1,000,000 (10^6) mg

7.5: MOS

This TMDL has an implicit MOS that is incorporated into the conservative assumptions used to develop the TMDL, and is not quantified. The MOS is implicit in this TMDL process through the use of conservative model input (temperature, DO concentrations and flow). Conservative temperature values are employed through the use of the highest average maximum temperature that would normally occur under critical stream flow conditions. The DO concentrations and stream flow employed for summer reflects the lowest DO and flows that would normally occur under critical conditions period. Extensive monitoring and review is part of implementation, and used to evaluate TMDL effectiveness and need for revision. Attaining numeric targets is aided by the conservative analyses used for deriving LA and WLAs, even for minor loading sources.

7.6: POTENTIAL FUTURE GROWTH

The three most likely growth events that could affect DO concentrations and organic matter loading in the New River are: (1) population growth in Imperial Valley; (2) population growth in the Mexicali area; (3) growth in confined animal feeding operations (CAFOs); and (4) Water Transfers. The following sections discuss the potential impacts of these projected growth events.

Population Growth in Imperial Valley

In the U.S. portion of the New River watershed, the annual population growth is projected at 3.3 % between 2000 and 2025, according to U.S. Department of Transportation, 2003. This growth will increase domestic wastewater discharged into the New River, from the current 8.7 mgd to a projected 13.8 mgd. Effluent from point sources, and discharges from nonpoint sources, will be required to meet DO WQO. Dischargers will continue to be required to consistently comply with their NPDES permits. Additionally, as WWTPs reach 80 percent of design capacity, they submit a report to RB informing of their plans to address future capacity and expansion.

Population Growth in the Mexicali Area

In the Mexican portion of the New River watershed, the annual population growth for the Mexicali municipality is projected at 2.6% (INEGI 2001). The area has a population of about 900,000, according to the 2005 census, and population is expected to increase to more than a million within 20 years. The Las Arenitas WWTP with a capacity of 20 mgd was built to accommodate eastern Mexicali in March 2007. Wastewater quality in the Mexicali area improved due to sewage infrastructure projects built in the last 2 to 5 years. Local demand for that water will increase because of Mexicali's growing population. Mexico may decide to reuse the wastewater that it currently discharges into the New River. Such a diversion of wastewater would decrease New River flows and might improve DO water quality at the International Boundary.

Growth in the CAFO Sector

Existing confined animal feeding operations (CAFOs) from outside Imperial County may relocate into the County, due to expanding metropolitan populations in San Diego County, Orange County, Riverside County, and the Central Valley. This would result in growth in the CAFO sector for Imperial County. CAFO facilities will continue to be controlled through General NPDES permits, which generally prohibit pollutant discharges into surface waters and require containment of on-site wastewater, including contaminated runoff[2].

Water Transfer

Imperial Valley cultivation acreage is projected to remain relatively constant at approximately 480,000 acres. However, irrigation deliveries will decrease as much as 300,000 AFY because of a water transfer from IID to the San Diego County Water Authority. The water to be transferred is irrigation water "conserved" by IID and Imperial Valley farmers. The New River's resulting flow would be about 300,000 AFY as described at the Environmental Impact Study (EIS)/Environmental Impact Report (EIR)

[2] Without controlling impacts from organic matter discharges from Mexico, it will be very difficult to measure acute impacts on DO caused by CAFOs downstream of the international border.

to address potential environmental impacts resulting from the proposed water transfer (IID, 2002).. This estimation is based on using the ratio of the New River flow at its delta with the Salton Sea to the total outflow of the New River-Alamo River-IID Drains system, and assuming that the 300,000 AFY reduction in irrigation deliveries will result in an equal decrease in total drain flow as a worst case scenario. However, dilution is not a factor in this DO TMDL.

7.7: RECOMMENDED ACTIONS FOR LINKAGE ANALYSIS AND TMDL ALLOCATIONS

DO is not considered a pollutant, therefore, load allocations can not be set for DO. Rather, this proposed TMDL targets pollutants that cause low DO, such as BOD and NH_3, to achieve the DO numeric target. Phase I of the TMDL will allocate and address loads from Mexico as proposed by the Model (Appendix F). These load allocations will be revised if a minimum of 5 mg/l of DO in the New River at the International Boundary at any time is not attained by the end of Phase 1 of TMDL implementation. Phase II of the TMDL implementation will address other sources, if necessary.

CHAPTER 8: PUBLIC PARTICIPATION

Public participation and stakeholder buy-in are vital to the success of developing and implementing a TMDL. Release of this Staff Report is an opportunity for the public to provide input to the Water Board. The TMDL will be formally established when it is adopted via a public process as an amendment to the Basin Plan. The public has had many opportunities to comment on and participate in the development of this Draft New River TMDL Action Plan and Staff Report.

SCOPING MEETING

Scoping Meetings are a requirement of the California Environmental Quality Act (CEQA). (Pub. Resources Code, § 21083.9.) The purpose of Scoping Meetings is to solicit public comments to help assess the potential environmental scope of the environmental analysis that must be conducted for this TMDL. The Scoping Meeting was held on May 14, 2003, in Calexico, California. The comments helped to shape the scope of the environmental review and specific aspects of the analysis.

PUBLIC MEETING

A Public Meeting was held on December 10, 2003, in Calexico, California to explain the TMDL process and the New River TMDLs to stakeholders. The meeting was a venue for dialogue between the Regional Board and stakeholders.

Another Public Meeting was held on September 19, 2008, in Seeley, California to discuss the implications of the Draft New River DO TMDL on the WWTPs that discharge directly or indirectly to the impaired section of the New River.

REGULAR OBSERVATION TOURS OF THE NEW RIVER

Regional Board members and staff regularly participate in monthly binational observation tours of the New River drainage and wastewater collection system in Mexicali.. The other participants of the binational observation tours are U. S. International Boundary and Water Commision (IBWC), Comision Estatal de Servicios Publicos de Mexicali (CESPM), Comision Estatal del Agua (CEA), Commission Internacional de Limites del Agua (CILA), Secretaria de Desarollo Urbano y de Ecologia (SIDUE), and the Office of California State Senator Denise Ducheny.

CHAPTER 9: IMPLEMENTATION PLAN

This Chapter identifies the entities, and describes requested actions to be taken by those entities, to achieve the TMDL. This section also describes Regional Board enforcement provisions and reporting requirements.

The TMDL proposes to eliminate low DO impairment, and specifies allowable loads of BOD and NH_3 based on steady-state Model projections. Phase 1 of TMDL Implementation (2010 – 2012) focuses on monitoring and taking action to address the pollutants coming from Mexico that lead to low DO. If WQOs are not met by the end of Phase 1, additional actions will be implemented in Phase 2 of the TMDL (2013 – 2015) to achieve WQOs. When allowable loads of BOD and NH_3 are achieved, they are expected to eliminate the impairment. If the impairment continues after the two phases, the DO TMDL will be revised accordingly.

This TMDL requests cooperation from Mexico to implement actions that prevent wastewater discharges into the New River in Mexicali from producing conditions that violate the TMDL. The Regional Board does not have the authority to require Mexico or the U.S. Government to reduce waste that crosses the International Boundary and impairs the New River. However, the Regional Board has the ability to raise public awareness and apply political pressure on agencies that directly cooperate with Mexico on International Boundary issues. Therefore, this TMDL requests that the U.S. Government (i.e., USIBWC and USEPA):

- Consider and specify measures to assist Mexico to ensure that discharges from Mexico do not violate or contribute to a violation of this TMDL; and
- Continue to conduct water quality monitoring in the New River at the International Boundary.

This TMDL also recommends actions for other third party cooperating agencies and organizations (Appendix G) with an interest in the New River's water quality. This TMDL requests that other third party cooperating agencies and organizations increase their coordination of New River projects through a Memorandum of Understanding (MOU).

Regional Board staff will track TMDL implementation, monitor water quality progress, enforce provisions, and propose modifications of the TMDL to the Regional Board, if necessary, in accordance with a time schedule.

9.1: RECOMMENDED IMPLEMENTATION ACTIONS FOR USIBWC AND USEPA

Pursuant to CWC Section 13225, the USIBWC and USEPA should implement the actions listed in Table 9.1. If these measures do not achieve TMDL numeric targets three years after USEPA approval, additional actions may need to be implemented in Phase II to address the remaining causes of low DO in the New River from point and nonpoint sources in the U.S., and from sources in Mexico with adverse impacts on DO immediately downstream of the International Boundary.

Table 9.1: Recommended Implementation Actions for USEPA and USIBWC to Address Waste Discharge from Mexico

Action	Description	Due Date
1- Develop and Submit to the Regional Board a New River DO TMDL Implementation Report	Describe in a report to the Regional Board measures taken or proposed to ensure Mexico does not cause or contribute to violations of this TMDL. The report should specify parties responsible for implementation, financial options, and provide an implementation time schedule	One (1) year after USEPA approval of the TMDL
2- Continue to conduct water quality and DO monitoring in the New River at the International Boundary.	Submit monitoring data and reports to the Regional Board	On-going
3- Develop and Submit to the Regional Board a New River DO TMDL Final Implementation Report	Describe in a final report to the Regional Board progress in completing implementation measures identified in Actions 1 and 2	Three (3) years after USEPA approval of the TMDL

9.2: RECOMMENDED IMPLEMENTATION ACTIONS FOR THIRD PARTY AGENCIES AND ORGANIZATIONS

The cooperation of third party agencies and organizations is pivotal for TMDL compliance. These entities have technical expertise, resources, and organizational structures to effectively address the DO impairment in the New River at International Boundary. The U. S. government through the USEPA and USIBWC has the authority to ensure waste discharges from Mexico do not cause or contribute to a violation of this TMDL. Actions taken by these federal agencies are extremely critical to the success of this TMDL.

The Third Party Cooperating Agencies and Organizations include:

- USEPA;
- USIBWC;
- U.S. members of the New River/ Mexicali Sanitation Program Binational Technical Advisory Committee (BTAC);
- North American Development Bank (NADBank);
- Border Environment Cooperation Commission (BECC);
- California Border Environment Cooperation Commission (CalBECC);
- City of Calexico New River Committee (CCNRC); and
- Citizens Congressional Task Force on the New River (CCTFNR).

Table 9.2 lists implementation actions for New River cooperating agencies and organizations.

Table 9.2: Recommended Implementation Actions for Third Party Cooperating Agencies and Organizations (USEPA, USIBWC, BTAC, NADBank, BECC, CalBECC, CCNRC, CCTFNR) to Address Waste Discharge from Mexico

Action	Description	Requested Due Date
1- Develop, Sign, and Submit to the Regional Board a New River DO TMDL Memorandum of Understanding (MOU).	Develop, sign, and submit to the Regional Board an MOU to ensure coordination of New River International Boundary projects. The MOU should address: 1. Establishment of a coordination committee consisting of one representative from each agency and the Regional Board; 2. Establishment of a coordination committee charter to ensure cooperation and communication between all agencies; 3. Compilation of a list of potential/ongoing projects and funding sources to address pollution in the New River/ International Boundary area; and 4. Submission of semi-annual progress reports to the Regional Board.	Six (6) months after USEPA approval of TMDL
2- Develop and Submit to the Regional Board New River DO TMDL Implementation Progress Reports.	Submit progress reports (through coordination committee) to the Regional Board describing status of projects and recommended actions to address pollution in the New River at the International Boundary.	Semiannually, with the first report due 12 months after USEPA approval of TMDL

9.3: REGIONAL BOARD COMPLIANCE ENFORCEMENT

The State Water Quality Enforcement Policy specifies that prompt, consistent, predictable, and fair enforcement are necessary to correct violations of WQSs and the CWC, and to ensure responsible parties implement control measures in a timely manner. The Regional Board is cognizant of the obstacles to effective enforcement against Mexico for polluting State waters. However, CWC §13000 states clearly the responsibility of the Regional Board:

"The Legislature further finds and declares that the health, safety and welfare of the people of the state requires that there be a statewide program for the control of the quality of all of the waters of the state; that the state must be prepared to exercise its full

power and jurisdiction to protect the quality of waters in the state from degradation originating inside or outside the boundaries of the state;...."

To this end, the Regional Board may use any of the following to promptly and effectively correct water quality threats:

- Issue enforcement orders pursuant to CWC §13304 to responsible parties failing to implement control measures to prevent or mitigate pollution or threatened pollution to surface waters;

- Issue enforcement orders pursuant to CWC §13301 to responsible parties violating Regional Board waste discharge requirements or prohibitions;

- Issue Administrative Civil Liability Complaints pursuant to CWC §13261, 13264, or 13268 to responsible parties failing to comply with Regional Board orders, prohibitions, and requests; and

- Refer recalcitrant violators of Regional Board orders and prohibitions to the District Attorney or Attorney General for criminal prosecution or civil enforcement.

Enforcement will be based on water quality results, and the extent responsible parties implement control measures.

9.4: WATER QUALITY IMPROVEMENT GOALS

The goal of the TMDL is to eliminate the DO impairment in the New River first 12 mile reach downstream of the International Boundary. Achieving this goal requires the U.S. to take steps to ensure municipal and industrial waste discharges to the New River in Mexico are adequately treated, and raw sewage bypasses eliminated. If actions do not achieve the TMDL Numeric Target in three (3) years, other measures may need to be implemented to address any remaining causes of low DO pollution.

9.5: TMDL REVIEW SCHEDULE

Annual Reports

Annual reports will be provided to the Regional Board describing progress toward milestone attainment. Reports will assess:

- monitoring results;
- water quality improvement;
- implementation actions and effectiveness; and
- recommendations for further actions, including more stringent enforcement.

Triennial Review

The State must hold public hearings for reviewing applicable WQSs, and modifying/adopting the standards as appropriate, pursuant to Section 303 of CWA and 40 CFR Part 130. The State also must formulate and periodically review (and update as necessary) Regional Basin Plans, pursuant to Section 13240 of the CWC. Following adoption by the Regional Board, Basin Plan amendments and supporting documents are submitted for review and approval to the SWRCB, the State Office of Administrative Law and USEPA

The first TMDL review will occur during a Regional Board public hearing scheduled three years after USEPA approval of the TMDL, at the approximate time of TMDL compliance. The Regional Board may consider more stringent regulatory mechanisms for the second implementation phase if the TMDL is not achieved at this time. The TMDL review will evaluate attainment of numeric targets, and include the same components assessed in annual reports. The schedule for TMDL review is provided in Table 9.3.

Table 9.3: TMDL Review Schedule*

Activity	Date
USEPA Approval of TMDL	2009
Begin TMDL Review	2012
End TMDL Review (Regional Board Public Hearing)	2013
* Dates are contingent upon Regional Board adoption, State Board approval, OAL approval and USEPA approval. Subsequent reviews will occur concurrently with Triennial Reviews.	

Public hearings will be held at least once every three years to review this TMDL. At these hearings, the Regional Board will:

- review monitoring results;
- review progress toward milestone attainment;
- consider approval of proposed management practices;
- consider enforcement action, if necessary; and
- consider revision of TMDL components.

This proposed review schedule indicates the Regional Board's commitment to periodic review and refinement of this TMDL, via the Basin Plan amendment process.

9.6: PROPOSED BASIN PLAN AMENDMENT

Regional Board staff recommends that the Regional Board amend the Basin Plan to include this TMDL and implementation plan to achieve compliance with WQS. This Staff Report:

- Identifies low DO impairment prompting TMDL development;
- Identifies and quantifies sources and causes of low DO in the New River at the International Boundary;
- Specifies in-stream numeric targets for DO for the New River at the International Boundary to ensure attainment of WQS;
- Allocates allowable loads in terms of BOD and NH_3 for pollutant sources to attain numeric targets and WQS; and
- Provides an implementation plan to achieve TMDL compliance.

CHAPTER 10: MONITORING PLAN

Regional Board staff will track TMDL implementation, monitor water quality progress, and revise the TMDL or implementation plan as necessary to:

- Address uncertainty that may have existed during TMDL development;
- Ensure successful implementation; and
- Ensure the TMDL is effective, given changes to the watershed due to TMDL development.

Two types of monitoring will be performed: water quality monitoring; and implementation tracking. The monitoring will be conducted pursuant to a Quality Assurance Project Plan (QAPP) that is modeled after and consistent with existing QAPPs for monitoring the New River at the International Boundary, and for the Surface Water Ambient Monitoring Program (SWAMP). The program will begin one month after USEPA approves the TMDL.

WATER QUALITY MONITORING

The implementation plan requires water quality monitoring to:

- verify TMDL compliance;
- characterize the physiochemical conditions, and
- determine the need for TMDL revision.

Monitoring objectives evaluate:

- attainment of WQOs;
- effectiveness of implementation;
- in-stream water quality; and
- temporal and spatial water quality trends.

Parameters sampled are given below and contingent on funding. Sampling will occur in the U.S. on at least the following five locations; International Boundary.[3] (IB); Evan Hewes Highway (EH), Forrester Road (FR), Drop Structure 2 (D2), Outlet to the Salton Sea (Outlet). Data from other agencies will be utilized if acceptable. Frequency is in brackets.

- flow [Quarterly]
- DO [Monthly]

[3] It is impractical to take water quality samples at the International Boundary because infrastructure (e.g., treatment lagoons, drains) empties into the New River at this location, causing mixing and aeration. This situation is atypical in the New River, and may yield misleading results. The closest site to the Border used for the International Boundary and SWAMP water quality monitoring programs is located in the New River at the IID Bridge, near the U.S. Geological Survey water quality gage, about 0.5 miles north of the Boundary. Locations closer to the International Boundary will be explored for this TMDL, and monitored if appropriate.

- temperature [Monthly]
- pH [Monthly]
- BOD [Monthly]
- organic matter [Monthly]
- TSSs (EPA Method No. 160.2) [Monthly]
- chemical oxygen demand [Monthly]
- NH_3 [Monthly]
- Nitrate (NO3) [Monthly]
- Nitrite (NO2) [Monthly]
- Total nitrogen (TN) [Monthly]

IMPLEMENTATION TRACKING PROGRAM

The Implementation Plan requires a tracking program to assess the effectiveness of current measures, and to evaluate progress attaining TMDL targets. Implementation progress reports will be provided to the Regional Board annually.

MEASURES OF SUCCESS, AND FAILURE SCENARIOS

Measures of Success

The primary measure of success for TMDL implementation is attainment of numeric targets for DO in the New River. Another measure of success is the level of TMDL compliance.

Failure Scenarios

The primary measure of failure for TMDL implementation is failure to achieve numeric targets for DO in the New River. In this event, the Regional Board may consider more stringent regulatory mechanisms.

CHAPTER 11: ECONOMIC ASSESSMENT

Minimum initial economic impacts to responsible parties for implementing Phase 1 of this TMDL are expected. However, if activities, including proper maintenance and operation of Las Arenitas WWTP, do not achieve New River DO WQS by the end of Phase 1, waste discharges will be further assessed and additional management practices with additional costs for implementing may be developed.

PHASE 1 ACTIONS

1. **Implementing the Water Quality Monitoring Plan.** Regional Board staff will develop and implement a QAPP for this TMDLs' Monitoring Plan.

2. **Developing a Technical Report on Waste Discharges from Mexico.** USEPA will coordinate submittal of a technical report describing measures to ensure that waste discharges to the New River from Mexico do not violate or contribute to a violation of this TMDL.

3. **Implementation Tracking Plan.** Regional Board staff will develop an Implementation Tracking Plan. TMDL Implementation staff will be assigned this task.

PHASE 2 ACTIONS

Phase II will be implemented if Phase I actions do not achieve the TMDL goals. Regional Board staff will consider actions for Phase 2 based on: assessment of TMDL Implementation actions, proposals by stakeholder groups; current legislation; and cost.

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APPENDIX A: DESCRIPTION OF NEW RIVER WATERSHED SOILS

The following soil association descriptions are excerpted from the Soil Conservation Service "Soil Survey of the Imperial County California Imperial Valley Area" (Zimmerman 1981).

All of the major soils associations within the Imperial Valley are within the "wet" series of poorly drained soils due to their low (less than 0.5 inches per hour) permeabilities. For soil classification purposes, a soil separate, silt is defined as individual mineral particles that range in diameter from the upper limit of clay (0.002 mm) to the lower limit of very fine sand (0.05 mm). As a soil textural class, silt is defined as soil that is 80 percent or more silt and less than 12 percent clay. The following three general soil associations dominate Imperial Valley: Imperial, Imperial-Holtville-Glenbar, and Meloland-Vint-Indio [Soil Conservation Service 1981]. The Soil Conservation Service (now known as the Natural Resources Conservation Service) soil descriptions are as follows (Soil Conservation Service 1981):

Imperial Soil Association: The Imperial soil association is comprised of nearly level, moderately well drained silty clay. This unit consists of very deep, calcareous soils formed in alluvial deposits. The largest area of the unit is around the town of Calipatria. Smaller areas are scattered throughout the lake basin. Natural drainage of soils has been altered by the seepage of water from irrigation canals and by extensive irrigation. Slopes are less then 2%. Elevation levels range from about 230 feet below to 30 feet above MSL. The unit is about 85 percent Imperial Soils and 15 percent minor soils. Imperial soils have a pinkish gray silty clay surface layer. Underlying this layer is pinkish gray is light brown silty clay. Minor soils are the well drained Glenbar, Holtville, Meloland, and Indio soils.

Imperial-Holtville-Glenbar Soil Association: The Imperial-Holtville-Glenbar soil association is nearly level, moderately well drained and well drained silty clay, silty clay loam, and clay loam. This map unit consists of very deep calcareous soils formed in alluvial deposits throughout the lake basin. Natural drainage of soils has been altered by the seepage of water from irrigation canals and by extensive irrigation. Slopes are less then 2%. Elevation is about 230 feet below to 30 feet above MSL. The unit is about 40 percent Imperial soils, 20 percent Holtville soils, 20 percent Glenbar soils, and 20 percent minor soils:

Imperial soils are moderately well drained. They have a pinkish gray silty clay surface layer. Underlying this layer is pinkish gray and light brown silty clay.
Holtville soils are well drained. They have light brown silty clay loam or silty clay layers about two feet thick. Underlying these are stratified very pale brown silt loam and loamy very fine sand.
Glenbar soils are well drained. They have a pinkish gray clay loam or silty clay loam surface layer. Underlying this is stratified light brown clay loam and silty clay loam.
Minor soils are the well drained Meloland, Indio, and Vint soils, and the somewhat excessively drained Rositas soils.

Meloland-Vint-Indio Soil Association: The Meloland-Vint-Indio soil association is nearly level, well drained fine sand, loamy very fine sand, fine sandy loam, very fine sandy

loam, loam and silt loam. This map unit consists of very deep, calcareous soils formed in alluvial deposits and in eolian material. Natural drainage of soils has been altered by the seepage of water from irrigation canals and by extensive irrigation. Slopes are less then 2%. Elevation is about 230 feet below to 30 feet above MSL. The map unit is about 30 percent Meloland soils, 25 percent Vint soils, 20 percent Indio soils, and 25 percent minor soils:

Meloland soils have a light brown, very fine sandy loam or fine sand surface layer. Underlying this is stratified very pale brown loamy fine sand and silt loam to a depth of about 2 feet. Below this is pink silty clay.
Vint soils have a light brown loamy very fine sand, fine sandy loam, or very fine sandy loam surface layer. Underlying this is stratified pink and light brown loamy fine sand.
Indio soils have a pinkish gray loam or very fine sandy loam surface layer. This is underlain by stratified very pale brown and pink layers of silt loam and loamy very fine sand.
Minor soils are the somewhat excessively well drained Holtville, Antho, and Glenbar.

APPENDIX B: WATER QUALITY DATA FOR NEW RIVER JAN 2007 TO DATE (SOURCE: USIBWC)

B1: Water Quality Data for New River at International Boundary for 2005 U.S. International Boundary and Water Commission (IBWC)

Data	Time	Flow cfs	Air Temp C	Water Temp. C	DO mg/l	pH	EC Umhos	Fecal Colif #/100 ml	BOD mg/l	COD mg/l
1/19/2005	8:30	193	17	14.8	1.17	7.21	4,760	446,667	34	54
1/27/2005	12:15	238	22	17.5	1.41	7.33	4,420	383,000		
2/9/2005	8:05	239	6	15.4	1.15	7.3	4,440	150,000	28	48
2/23/2005	8:30	300	12	17	2.4	7.3	4,030	900		
3/9/2005	8:05	303	21	20.4	0.94	7.4	4,650	380,000	25	37
3/23/2005	9:15	300	19	18.7	1.44	7.34	4,890	115,000		
4/6/2005	8:00	200	18	20.9	0.41	7.35	4,840	135,000	15	58
4/20/2005	7:45	194	17	20	1.34	7.44	5,230	155,000		
5/11/2005	7:45	232	20	20.8	0.54	7.5	5,010	530,000	18	84
5/26/2005	11:00		38	28.3	0.22	7.51	5,550			
6/8/2005	8:05	137	26	25.8	0.14	7.41	5,670	250,000		
6/22/2005	8:15	177	36	29.3	0.18	7.45	5,400	380,000	40	70
7/6/2005	11:20	188	38	27.9	0.22	7.34	5,790	170,000	38	67
7/20/2005	10:00	264	35.5	30.8	0.81	7.18	5,701	751,667		
8/10/2005	7:55	379	26.5	29.8	0.09	7.29	3,277	2,350,000	49	41
8/24/2005	8:00	167	31	30.7	0.29	7.39	4,350	583,333		
9/14/2005	8:30	143	21	23.9	0.13	7.57	5,002	1,375,000	23	104
9/28/2005	9:20	153	33	24.8	0.07	7.51	4,586	380,000		
10/12/2005	7:45	138	18	22.8	1.2	7.43	4,910	360,000	57	147
10/26/2005	8:10	188	18	22	1.25	7.1	4,667	216,667		
11/9/2005	8:35	145	16	20.5	1.29	7.56	4,444	203,333	74	112
11/22/2005	11:00	153	23	16.8	1.08	7.41	4,574	280,000		
12/14/2005	8:00	208	16	12.7	1.05	7.61	4,272	136,666		
Mean		**210.9**	**23.0**	**22.2**	**0.82**	**7.39**	**4,803**	**442,374**	**36**	**75**

B2: Water Quality Data for New River at International Boundary for 2006 U.S. International Boundary and Water Commission (IBWC)

Data	Time	Flow cfs	Air Temp C	Water Temp. C	DO mg/l	pH	EC Umhos	Fecal Colif #/100 ml	BOD mg/l	COD mg/l
1/11/2006	9:00	189	8	13.6	0.5	7.66	4,665	226,667	44	108
1/25/2006	11:00	200	18	12.9	0.45	8.31	4,678	120,000		
2/8/2006	8:30	198	15.4	8.5	0.56	7.93	4,682	143,333	33	81
2/22/2006	10:10	261	17	13.8	3.22	7.63	5,106	115,000		
3/8/2006	9:55	241	16.5	16	1.7	7.55	5,074	440,000	22	133
3/22/2006	8:45	268	13	15.9	2.02	7.55	4,619	300,000		
4/12/2006	7:50	264	17.5	20.7	1.17	7.6	5,170	336,667	31	82
4/26/2006	8:55	243	20	21.3	1.45	7.65	5,306	510,000		
5/10/2006	11:15	198	30	26.4	0.94	7.56	5,732	370,000	33	62
5/24/2006	8:40	182	25.5	25.6	0.12	7.43	5,774	1,676,667		
6/7/2006	11:35	163	35	29.3	0	7.39	5,814	1,350,000	37	81
6/28/2006	7:50	167	32	29.6	0.16	7.56	5,429	1,900,000		
7/12/2006	11:45	156	41	32.4	0.1	7.31	5,619	1,483,333	30	99
7/26/2006	7:15	159	31	31.7	0.73	7.52	5,481	2,950,000		
8/2/2006	1:15	179	37	31.3	0.25	7.52	5,213	180,000	33	91
8/16/2006	9:00	113	34	31.1	0.6	7.58	5,174	1,550,000		
9/13/2006	12:00	163	32	29.3	0.24	7.48	4,851	1,500,000	42	118
9/27/2006	7:50	158	25	26.4	0.4	7.56	4,593	1,833,333		
10/11/2006	12:25	143	32	23.1	0.27	7.5	4,634	1,036,667	34	64
10/25/2006	9:40	173	25	23	0.53	7.6	4,223	1,020,000		
11/15/2006	9:50	152	21	18.9	0.91	7.61	2,516	1,570,000	63	153
11/29/2006	8:40	129	9	14.6	5.98	7.33	5,229	1,816,667		
12/6/2006	1:15	143	23	12.1	3.8	7.46	4,729	606,667	21	74
12/20/2006	9:15	187	7	12.4	2.16	7.47	4,668	710,000		
Mean		**184.5**	**23.5**	**21.7**	**1.18**	**7.6**	**4957.5**	**989,375**	**35.3**	**95.5**

B3: Water Quality Data for New River at International Boundary for 2007 U.S. International Boundary and Water Commission (IBWC)

Data	Time	Flow cfs	Air Temp C	Water Temp. C	DO mg/l	pH	EC Umhos	Fecal Colif #/100 ml	BOD mg/l	COD mg/l
1/10/2007	9:25	178	12	13	1.94	7.34	4,547	575,000	34	74
1/24/2007	12:00	198	20	12.2	3.28	7.37	4,643	360,000		
2/7/2007	7:50	235	7	15.2	2.39	7.26	4,293	310,000	28	112
2/21/2007	8:25	115	8	16.7	1.07	7.47	4,733	1,200,000		
3/7/2007	8:05	184	18	17.3	7.01	7.5	5,622	60,000	24	41
3/22/2007	9:00	195	18	19.3	7.21	7.55	6,089	18,000		
4/11/2007	8:40	205	23	23.4		7.56	5,916	22,000	7	31
4/25/2007	8:20	210	23	21.2	5.58	4.67	5,157	25,334		
5/9/2007	7:45	174	24	24.1	4.22	7.28	5,956	89,000	13	32
5/24/2007	9:00	143	29	26.9	1.79	5.04	6,561	287,500		
6/13/2007	8:05	146	28	26.6	2.58	7.18	6,161	78,000	11	35
6/27/2007	8:50		32.5	28.1	2.4	7.33	6,034	76,000		
7/12/2007	8:35		30	27	0.92	7.16	6,362	820,000	17	42
7/25/2007	8:30	123	34	29.7	1.54	7.54	6,624	581,667		
8/8/2007	7:55	123	28	28	1.94	7.38	6,690	165,000	13	68
8/22/2007	8:20		33	32	1.37	7.57	9,098	10,000		
9/5/2007	8:10		32	32	2.27	7.38	7,038	20,000	9	70
9/19/2007	9:50		31	25.7	6	7.44	5,840	54,750		
10/3/2007	7:55	129	28	25.7	5.73	7.47	5,393	65,750	5	65
10/17/2007	8:35	60	24	20.6	4.1	7.09	5,939	476,667		
11/7/2007	8:25	99	16	20.1	5.96	7.15	4,931	4,000	15	67
11/28/2007	8:50	122	11	14.2	5.05	6.76	5,209	660,000		
12/5/2007	8:15	181	9	13.3	4.95	7.35	5,365	57,334		55
12/19/2007	9:05	156	13	11.3	5.1	6.82	4,789	38,667		
Mean		**156.6**	**22.1**	**21.8**	**3.7**	**7.1**	**5,791**	**252,278**	**16.0**	**57.7**

B4: Water Quality Data for New River at International Boundary for 2008 U.S. International Boundary and Water Commission (IBWC)

Data	Time	Flow cfs	Air Temp C	Water Temp. C	DO mg/l	pH	EC Umhos	Fecal Colif #/100 ml	BOD mg/l	COD mg/l
1/9/2008	8:35	149	9	12	6.54	6.62	4,958	10,667	14	53
1/23/2008	10:35	163	14	11.6		7.28	5,187	72,667		
2/6/2008	8:45	208	7	11.8	6.07	7.11	4,589	25,000	13	49
2/21/2008	10:45	183	20	14.8	8.85	7.53	5,462	18,333		
3/12/2008	8:45	253	20	18.8	4.78	7.39	5,406	84,000	15	55
3/26/2008	11:25	205	31	20.8	7	7.26	6,162	25,333		
4/23/2008	1:45	205	32	21.4	5.49	7.45	6,093	80,750	15	45
5/21/2008	8:40	152	27	26	3.11	7.08	6,726	60,000		
5/28/2008	8:15	152	23	21.4	2.15	6.74	5,750	298,333	17	55
6/11/2008	9:05	138	33	26.8	0.64	7.37	6,763	86,250		
6/26/2008	7:10	143	27	28.6	1.86	7.28	6,465	490,000	18	72
7/9/2008	9:10	140	35	31	0.9	7	5,843	2,500,000		
7/30/2008	7:35	129	30	30.5	3.26	6.3	6,190	11,000	10	45
8/13/2008	8:35	113	33	30.7	2.74	7.27	6,502	78,000		
8/28/2008	7:00	137	33	31.3	3.72	7.28	6,154	54,000	11	19
9/10/2008	8:50	153	30.1	28.4	3.64	7.07	5,682	162,500		
9/17/2008	7:40	173	28	28.1	3.51	7.22	4,828	175,000	14	53
10/15/2008	8:30	117	16	18.9	4.39	7.12	6,387	795,000		
Mean		**161.8**	**24.9**	**22.9**	**4.04**	**7.1**	**5,842**	**279,269**	**14.1**	**49.6**

APPENDIX C: DO DATA FOR AGRICULTURAL DRAINS IN THE NEW RIVER WATERSHED

Table C-1: DO (mg/L) from Greeson and Rice 3 Agricultural Drains in the New River Watershed. Data from February 2004 to September 2007 by Sample Site

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Greeson	**2004**		8.4	7.7	9.1	8.6	7.3	6.0	7.6	6.9	7.8	10.4	9.6
	2005	9.1	9.3	10.5	8.1	7.4	6.3	7.9	3.6	7.0	6.5	10.2	11.0
	2006	10.1	10.8	9.0	8.5	5.6	6.1	4.1	6.5	5.6	6.0	10.5	10.4
	2007	8.0	8.7	8.0	6.7	5.7	5.5	4.2	4.9	4.9			
Rice 3	**2004**		10.1	7.8	8.5	11.3	7.1	7.8	5.7	9.0	8.5	10.0	10.8
	2005	12.0	9.4	9.6	8.6	6.9	7.3	5.0	4.6	7.8	6.4	9.7	NA
	2006	10.8	11.7	9.3	9.3	7.6	7.0	7.0	5.3	5.2	11.7	NA	9.9
	2007	10.4	11.5	9.9	8.8	7.2	7.0	5.8	7.9	7.7			

Table C-2: DO (mg/L) from Fig, Rice and North Central Agricultural Drains in the New River Watershed. Data from April 2004 to July 2007 by Sample Site

	2004			2005				2006				2007		
	Apr	**Jul**	**Oct**	**Jan**	**Apr**	**Jul**	**Oct**	**Jan**	**Apr**	**Jul**	**Oct**	**Jan**	**Apr**	**Jul**
Fig	8.9	6.0	8.8	10.4	8.5	6.4	7.7	10.3	9.5	4.6	7.5	10.2	8.1	4.4
Rice	10.2	11.5	7.9	6.9	8.9	7.3	8.9	9.3	6.1	7.5	12.1	12.5	9.3	7.6
North Central	7.9	2.6	9.2	10.4	7.4	8.9	6.9	11.3	7.5	1.2	4.9	10.2	8.6	4.5

Table C-3: DO (mg/L) from Spruce, Timothy 2, Trifolium 10 and Trifolium 1 Agricultural Drains in the New River Watershed. Data from April 2004 to July 2007 by Sample Site

	2004				2005				2006				2007		
	Feb	**May**	**Aug**	**Nov**	**Feb**	**May**	**Aug**	**Nov**	**Feb**	**May**	**Aug**	**Nov**	**Feb**	**May**	**Aug**
Spruce	9.3	11.3	13.5	10.0	10.4	8.9	7.3	10.8	10.6	8.4	7.1	12.0	9.7	7.5	8.0
Timothy 2	9.7	11.4	9.8	11.5	9.4	9.4	6.2	9.4	9.9	8.6	5.8	9.2	9.1	6.3	8.6
Trifolium 10	9.8	10.5	7.0	9.7	9.8	8.2	8.7	10.1	10.7	7.6	6.2	8.9	9.4	6.9	7.2
Trifolium 1	9.5	9.5	6.3	14.6	12.7	7.6	5.4	10.9	10.7	7.6	3.9	11.5	9.1	6.4	6.1

Table C-4: Annual Averages of DO (mg/L) from Agricultural Drains in the New River Watershed. Data from April 2004 to July 2007 by Sample Site

	2004	2005	2006	2007	2004-2007
Greeson	8.2	8.2	7.8	6.3	7.6
Rice 3	9.1	8.2	9.2	8.5	8.7
Fig	8.5	8.2	8.0	7.5	8.1
Rice	9.1	8.6	8.7	9.8	9.1
North Central	7.5	8.6	6.2	7.8	7.5
Spruce	11.0	9.3	9.5	8.4	9.6
Timothy 2	10.6	8.6	8.4	8.0	8.9
Trifolium 10	9.3	9.2	8.4	7.8	8.7
Trifolium 1	10.0	9.1	8.4	7.2	8.7

APPENDIX D: NPDES PERMITTEES INFORMATION AND DATA

Table D1: Permit Number, Discharger Information, Discharge Location, Facility Design Flow, and Discharge Classification for NPDES WWTPs Discharging Wastewater into the Impaired Section of the New River.

Discharger/ Name of Facility/ Facility Address	NPDES Permit #	Discharge Location	Facility Design Capacity (mgd)	Discharge Classification[1]
City of Calexico/ Municipal Wastewater Treatment Plant/ 298 East Anza Road, Calexico	CA7000009	New River, about 1.5 miles downstream of the International Boundary	**4.3**	**Major**
Seeley County Water District/ Seeley County Wastewater Treatment Plant/ 1898 West Main Street, Seeley, CA 92273	CA0105023	New River, about 1500 feet downstream of Evan Hewes Road Bridge	**0.25**	**Minor**
Rocky Vandergriff Water Treatment Services/ Date Gardens Mobile Home Park/ 1020 W. Evan Hewes Hwy., El Centro, CA 92243	CA0104841	Rice 3 Drain, at a point 7 miles upstream of where the Rice 3 Drain discharges into the New River	**0.021**	**Minor**
McCabe Union School District/ Municipal Wastewater Treatment Plant/ 701 West McCabe Rd., El Centro, CA 92243	CA0104281	Wildcat Drain, at a point 3 miles upstream of where the Wildcat Drain discharges into the Rice 3 Drain. Following the junction of the Wildcat Drain with the Rice 3 Drain, the Rice 3 Drain flows for another 7 miles before it discharges into the New River	**0.015**	**Minor**
State of California Department of Corrections/ Centinela State Prison Waste Water Treatment Plant/ 2302 Brown Road, Imperial, CA 92251	CA7000001	Dixie Drain 1-C, which flows about 6 miles before it discharges into the New River	**0.73**	**Minor**
U.S. Navy/ Naval Air Facility El Centro Wastewater Treatment Plant, El Centro, CA 92243	CA0104906	New River, about 1000 feet upstream of Worthington Road Bridge	**0.3**	**Minor**

[1] Discharges of less than 1.0 mgd are classified as Minor by USEPA

Table D2: Monthly Self Monitoring Report Flow, BOD, DO, and NH_3 Data for NPDES WWTPs Effluent in the New River Watershed

City of Calexico WWTP

Flow (mgd)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	2.842	2.743	2.693	2.711	2.761	2.673	2.702						
2007	2.801	2.762	2.766	2.678	2.749	2.366	2.538	2.715	2.788	2.812	2.863	2.867	2.725
2006	2.600	2.576	2.631	2.591	2.608	2.612	2.547	2.588	2.779	2.795	2.863	2.861	2.671
2005	2.406	2.395	2.281	2.269	2.285	2.340	2.311	2.584	2.392	2.368	2.703	2.613	2.412
2004								2.302	2.432	2.482	2.424	2.383	2.405

BOD (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	24	26.3	19.8	24.8	24.2	22.8	14.5						
2007	30	23	26	30	28	14	13	13	14	21	23	29	22.00
2006	16.9	16.5	21.9	23.7	29.5	30.0	29.9	21.6	25.5	21.6	25.9	23	23.85
2005	29.4	24.1	24.1	26.7	15.2	13.6	12.5	16.2	14.8	9.8	14.5	23.9	18.73
2004								8.3	16.9	14.5	20.3	29.3	17.86

DO (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	6.27	6.22	5.90	5.34	5.23	4.89	4.09						
2007	6.25	6.16	5.80	5.60	4.89	4.49	4.25	3.94	4.34	4.71	4.82	5.97	5.10
2006	5.84	6.38	5.68	5.12	5.14	4.61	4.07	4.12	4.34	4.16	4.91	5.87	5.02
2005	6.48	6.67	6.26	6.00	4.99	4.30	3.82	4.43	4.83	4.56	5.20	5.86	5.28
2004								4.86	4.82	5.22	5.86	6.63	5.48

NH3 (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	16.80	17.36	17.36	7.28	11.2	ND	2.24						
2007	11.76	10.64	2.24	4.48	10.64	0.56	10.64	2.24	2.24	4.48	2.80	2.80	5.46
2006	4.48	2.80	2.80	2.8	0.56	2.24	3.94	1.12	3.36	5.04	1.68	3.36	2.85
2005	8.4	7.84	5.6	7.28	2.24	1.68	3.36	1.68	3.36	1.12	2.80	6.16	4.29
2004								2.8	1.68	0.56	0.56	6.782	2.48

Seeley WWTP

Flow (mgd)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2008	0.1071	0.1033	0.1016	0.0951	0.1242								.1066
2007	0.086	0.084	0.103	0.096	0.084	0.066	0.072	0.054	0.0965	0.1056	0.1042	0.0834	0.0862
2006	0.140	0.133	0.084	0.053	0.110	0.126	0.142	0.067	0.101	0.135	0.1393	0.1250	0.113
2005	0.094	0.065	0.022	0.020	0.0178	0.0159	0.017	0.020	0.059	0.112	0.116	0.123	0.057
2004	0.085	0.085	0.063	0.078	0.073	0.053	0.057	0.054	0.059	0.077	0.108	0.098	0.074

BOD (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2008	15.6	14.2	10.0	6.1	8.10								10.8
2007	11.6	10.6	7	9.8	18.9	10.5	5.6	6.2	9.2	16.2	6.7	8.1	10.03
2006	8.1	11.8	10.9	12.6	7.9	9.2	6.6	12.3	14.6	10.6	13.9	16.7	11.27
2005	43.5	26.3	41.4	33.4	23.3	5.2	7.7	14.7	11.4	10.2	7.6	9.5	19.52
2004	40.3	48.5	57.6	53.5	67.9	39.5	70.9	40.6	27.6	23.3	29.6	40.9	45.02

DO (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2008	7.8	7.2	7.2	6.9	7.5								7.32
2007	7.7	8.0	7.40	7.90	7.90	8.30	7.9	7.8	7.8	7.7	7.4	7.3	7.76
2006	8.1	7.9	8.4	8.1	8.1	8.3	8.0	8.1	8.1	7.9	7.9	7.8	8.06
2005	5.62	11.54	8.14	8.83	8.58	8.48	8.51	8.30	9.0	8.40	8.5	8.1	8.50
2004	6.65	3.76	10.80	6.07	10.68	15.50	12.46	12.84	10.45	11.26	8.50	4.81	9.48

NH3 (mg/l)					
	1st QTR	2nd QTR	3rd QTR	4th QTR	Average
2008	2.21				
2007	10.08	10.08		2.24	7.47
2006	1.68	3.36	25.20	23.52	13.44
2005	0.56	0.10	6.16	14.0	5.21
2004	18.5	17.4	11.20	10.08	14.28

Centinela State Prison WWTP

Flow (mgd)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	0.683	0.617	0.690	0.661	0.594								0.649
2007	1.049	0.982	1.026	0.890	0.686	0.565	0.519	0.648	0.728	0.672	0.637	0.647	0.754
2006	0.714	0.694	0.889	0.890	0.886	0.869	0.935	0.934	0.991	0.962	1.046	1.058	0.906
2005	0.602	0.657	0.586	0.586	0.613	0.614	0.657	0.703	0.720	0.743	0.741	0.682	0.659
2004	0.724	0.745	0.770	0.759	0.767	0.711	0.583	0.604	0.587	0.628	0.614	0.593	0.674

BOD (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	34	33	34	33	34								33.60
2007	32	35	33	32	31	33	35	35	30	33	35	36	32.33
2006	28	28	24.8	34	31	32	31	36	34	35	32	32	31.48
2005	14	10.3	8.3	9.0	13	16	22.7	23.8	29	26	24.3	26	18.53
2004	17.0	16.0	20.2	18.0	23.0	17.0	12.1	6.4	7.2	13.0	11.3	15	14.68

DO (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	9.0	8.8	8.4	8.0	7.3								8.30
2007	9.5	9.5	8.2	7.5	7.0	7.1	5.8	5.8	6.3	7.9	8.0	9.2	7.65
2006	11.3	11.1	10.6	10.3	9.7	7.8	6.8	6.9	7.6	7.9	8.5	9.1	8.97
2005	9.8	9.5	9.1	9.1	9.3	10.6	7.5	8.1	10.0	9.3	10.8	11.9	9.58
2004	10.6	10.3	8.5	8.1	8.2	7.5	6.4	7.5	7.9	8.4	10.4	10.8	8.72

NH3					
	1st QTR	2nd QTR	3rd QTR	4th QTR	Average
2008	2.65				
2007	< 0.56	0.56		1.65	1.1050
2006	0.56	2.24	2.24	0.60	1.6800
2005	0.56	0.56	0.56	0.56	0.5600
2004	< 0.1	1.68	0.56	< 0.1	1.1200

US Navy WWTP

	Flow (mgd)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	0.04	0.04	0.06	0.060									0.05
2007	0.064	0.077	0.077	0.08	0.1	0.13	0.14		0.077	0.11	0.10	0.07	0.089
2006	0.081	0.124	0.081	0.095	0.146	0.139	0.172	0.134	0.115	0.102	0.082	0.053	0.110
2005	0.092	0.093	0.082	0.087	0.109	0.117	0.146	0.180	0.161	0.118	0.076	0.066	0.111
2004	0.073	0.094	0.091	0.102	0.102	0.140	0.131	0.131	0.133	0.119	0.950	0.093	0.180

	BOD (mg/l)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	4.7	4.4	5.6	4.6	6.1								5.08
2007	6.0	4.5	5.0	6.5	3.4	3.8	4		10.8	4	4.7	4.7	5.87
2006	4.0	3.0	3.7	3.7	3.3	4.5	3.9	3.7	4.9	4.8	3.8	5.2	4.04
2005	3.9	6.1	2.7	3.0	3.3	3.5	5.5	3.1	2.4	3.7	3.3	4.4	3.74
2004	4.4	7.9	7.4	4.6	4.4	5.3	3.8	3.2	3.1	2.7	3.1	2.1	4.34

	NH3 (mg/l)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2008	0.56	4.5	1.7	1.12	1.1								1.80
2007	< 0.56	< 0.56	1.12	NA	1.68	0.6			0.56	1.12	0.56	0.56	0.70
2006	1.12	< 0.5	0.56	0.56	0.56	< 0.56	2.24	1.12	0.56	1.12	1.38	0.56	0.98
2005	1.68	1.12	0.56	0.56	0.56	1.12	1.12	< 0.1	0.56	0.56	0.56	1.68	0.92
2004	0.56	1.68	0.54	< 0.1	1.12	0.56	0.56	0.56	0.56	< 0.5	1.2	0.56	0.79

McCabe Union School District WWTP

Flow (mgd)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2008	0.0045	0.0050	0.0041	0.0031	0.0039								.0041
2007	0.0032	0.0043	0.0034	0.0076	0.0201	0.0075	NA	NA	0.0049	0.00708	0.0042	0.0034	0.007
2006	0.0037	0.0031	0.0054	0.0044	0.0064	0.0011	NA	NA	0.0085	0.0050	0.0034	0.0036	0.004
2005	0.0009	0.0013	0.0012	0.0021	0.0022	0.0023	NA	NA	0.0045	0.0033	0.0018	0.0029	0.002
2004	0.0013	0.0011	0.0014	0.0013	0.0012	0.0011	NA	NA	0.0013	0.0013	0.0016	0.0007	0.001

BOD (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2008	7.8	7.8	4.3	3.9	7.1								6.18
2007	6.2	8.5	3.8	5.8	6.9	4.6	NA	NA	5.7	11.7	6.0	4.2	6.34
2006	4.7	3.8	5.3	7.4	6.1	9.0	NA	NA	2.8	4.3	3.4	3.8	5.06
2005	5.1	3.3	2.2	2.5	3.4	3.1	NA	NA	8.6	2.1	4.2	3.8	3.83
2004	3.5	5.0	1.5	3.2	2.2	3.0	NA	NA	5.4	3.2	2.7	3.7	3.33

DO (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2008	6.13	7.10	6.10	6.10	7.30								6.55
2007	6.50	6.10	2.03	4.50	4.97	4.90	NA	NA	6.30	6.10	6.30	6.30	5.40
2006	5.75	6.10	5.80	3.80	4.30	6.90	NA	NA	5.30	2.90	8.10	7.30	5.63
2005	5.59	4.43	4.45	5.10	6.19	5.69	NA	NA	6.35	4.85	5.18	2.70	5.05
2004	5.57	3.80	3.50	3.40	3.10	2.80	NA	NA	5.30	6.45	6.48	2.34	4.27

NH3 (mg/l)			
	1st Semi-Annual	2nd Semi-Annual	Average
2008			
2007	3.36	1.12	2.24
2006	5.0	4.48	4.76
2005	NA	2.24	2.24
2004	1.12	11.8	6.46

Date Gardens Mobile Home Park

Flow (mgd)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2008													
2007	0.0089	0.0088	0.0099	0.0083									.0090
2006	0.0117	0.0110	0.0059	0.0088	0.0094	0.0092	0.0088	0.0089	0.0082	0.0086	0.0090	0.0089	0.0090
2005	0.0090	0.0086	0.0104	0.0091	0.0100	0.0117	0.0118	0.0124	0.0118	0.0116	0.0115	0.0118	.0108
2004	0.0178	0.0174	0.0175	0.0177	0.0124	0.0075	0.0060	0.0104	0.0102	0.0114	0.0091	0.0098	0.0123

BOD (mg/l)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2008													
2007	7.4	6.3	5.0	14.7									8.3
2006	8.0	7.4	4.6	6.0	3.1	6.8	6.4	28.8	7.0	7.2	28.8	14.7	10.7
2005	5.0	3.0	9.0	2.0	5.5	3.0	NA	1.0	1.0	1.5	1.0	3.0	3.2
2004	8.5	3.0	3.0	ND	5.0	2.0	19.0	1.0	1.0	ND	2.0	2.0	4.7

APPENDIX E: REGIONAL BOARD DO DATA AT FOUR NEW RIVER SAMPLING LOCATIONS

New River at International Boundary (IB)

Month	Year					
	2003	2004	2005	2006	2007	2008
Jan		0.73	1.51	1.63	1.93	8.76
Feb		3.05		1.58	1.87	7.58
Mar	0.67	1.50		4.09	4.07	2.90
Apr	0.63	0.62	0.00	1.62		5.86
May	0.46	0.87	0.55	2.12	2.76	3.95
Jun		0.34	0.30	0.29	2.28	3.33
Jul	0.58	0.38	0.00	0.66	1.29	4.19
Aug	0.41	0.70	0.73	0.68		4.70
Sept		0.66	0.40	1.17		2.80
Oct	0.28	0.25	1.69	0.58		4.06
Nov		0.87	1.34	12.21	6.20	
Dec	1.71	1.53	1.98	2.59	7.44	
Average	**0.68**	**0.96**	**0.85**	**2.44**	**3.48**	**4.81**

New River at EvenHews Highway(EH)

Month	Year					
	2003	2004	2005	2006	2007	2008
Jan		0.94	1.47	1.81	1.72	5.2
Feb		4.49		3.01	2.40	5.57
Mar	1.37	2.40		3.78	3.33	2.72
Apr	1.14	1.57	0.46	3.59		5.28
May	1.23	1.89	1.58	2.80	4.36	3.61
Jun		1.49	0.65	0.50	3.27	2.97
Jul	3.33	1.31	0.00	0.98	2.87	3.40
Aug	0.79	0.84	0.86	0.56		3.88
Sept		0.98	3.10	1.26		2.63
Oct	1.39	1.26	0.89	4.76		5.01
Nov		1.43	1.26	4.76	4.94	
Dec	3.05	1.79	3.09		5.50	
Average	**1.76**	**1.70**	**1.34**	**2.53**	**3.55**	**4.03**

New River at Drop Structure 2 (D2)

Month	Year					
	2003	2004	2005	2006	2007	2008
Jan		8.93		9.32	7.85	
Feb		9.95		8.32	9.02	8.98
Mar	7.58	7.86		9.53	6.02	8.02
Apr	6.55	6.75	6.49	7.96		7.82
May	6.83	5.4	7.2		6.92	6.76
Jun		7.18	5.78	7.73	7.36	6.24
Jul	4.39	7.16		5.21	6.68	7.61
Aug	5.67	5.5	6.03	5.41		6.16
Sept		6.18	6.81	6.56		7.10
Oct	6.56	7.13	7.16	7.19		9.25
Nov		8.43	7.46	9.42	8.25	
Dec	8.68	8.64	8.6	8.64	9.31	
Average	**6.61**	**7.43**	**6.94**	**7.75**	**7.68**	**7.05**

New River at Outlet to the Salton Sea (Outlet)

Month	Year					
	2003	2004	2005	2006	2007	2008
Jan		7.24	6.82	8.72	6.9	7.97
Feb		8.37		7.12	7.72	7.87
Mar	6.45	6.35		8.08	5.2	6.41
Apr	7.6	5.44		6.72		6.62
May	7.38	8.33	5.46		5.55	5.27
Jun		5.76	3.95	3.79	6	4.6
Jul	3.11	5.25	1.9	3.73	5.61	6.72
Aug	4.05	4.22	4.02	4.3		4.90
Sept		5.15	5.9			5.75
Oct	5.71	6.2				8.61
Nov		7.36	6.98	9.88	7.15	
Dec	7.71	7.04	7.84	7.9	7.63	
Average	**6.00**	**6.39**	**5.36**	**6.69**	**6.47**	**6.47**

APPENDIX F: NEW RIVER DO QUAL2K MODEL

APPENDIX G: NEW RIVER THIRD PARTY COOPERATING AGENCIES AND ORGANIZATIONS

The cooperation of third party agencies and organizations is pivotal for TMDL compliance. These entities have technical expertise, resources, and organizational structures to effectively address the DO impairment in the New River at International Boundary. The U. S. government through the USEPA and USIBWC has the authority to ensure waste discharges from Mexico do not cause or contribute to a violation of this TMDL. Actions taken by these federal agencies are extremely critical to the success of this TMDL.

G.1. United States Government

The United States Government, through USEPA and USIBWC, is responsible for ensuring that waste discharges to the New River and its tributaries in Mexico do not violate binational water treaties. IBWC is a U.S.-Mexican federal agency with roots in the "Treaty of Guadalupe Hidalgo of Peace, Limits and Settlement," signed by both countries in February 1848. The IBWC was established as the International Boundary Commission (IBC) in 1889 to deal with boundary issues. In 1944, the U.S. and Mexico signed the treaty entitled "Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande" (Mexican-American Water Treaty), which was ratified by the U.S. Congress in 1945. The Mexican-American Water Treaty changed the name of the IBC to the IBWC, and expanded IBWC jurisdiction and responsibilities. Both the United States and Mexico have commissioners appointed to the IBWC. In Mexico, the IBWC is called “Comision Internacional de Limites y Aguas” (CILA).

The USIBWC is part of the State Department. USIBWC jurisdiction extends along the International Boundary and inland into both countries where international projects are constructed. Responsibilities include implementing International Boundary water treaties and settling differences in this regard. The treaty specifies that the USIBWC is responsible for resolving sanitation and water quality problems at the International Boundary in cooperation with its Mexican Counterpart.

The Presidents of Mexico and the United States signed the La Paz Agreement in August 1983. The La Paz Agreement made the USEPA the U.S. coordinator for pursuing practical, legal, institutional and technical measures to protect and improve the environment at the International Boundary. The agreement originally made the Mexican Secretaría de Desarrollo Urbano y Ecologia (SEDUE) the coordinator for Mexico. In 1992, Mexico transferred responsibility for International Boundary issues to the Secretaría de Desarrollo Social (SEDESOL). Currently, the Comision Nacional del Agua (CNA) has primary responsibility for water issues in Mexico in the International Boundary area.

To achieve this TMDL, BOD and NH_3 must be reduced from the New River and its tributaries in Mexicali, and immediate steps need to be taken to stop trash from crossing the International Boundary via the New River. This will require cooperation from Mexico and U.S. assistance.

G.2. New River/ Mexicali Sanitation Program Binational Technical Advisory Committee (BTAC)

BTAC oversees the measures identified in Minute No. 288 (titled "Conceptual Plan for the Long Term Solution to the Border Sanitation Problem of the New River at Calexico, CA – Mexicali, Baja California"). Minute No. 288 was signed in October 1992 by USIBWC and CILA (the Mexican counterpart to USIBWC). Minute No. 288 established short- and long-term solutions for sanitation problems plaguing the New River at the International Boundary. The primary focus of Minute No. 288 is to improve wastewater infrastructure. Short-term measures were completed in 1999. Long-term measures include constructing the Las Arenitas 20-MGD WWTP, and reconstruction/installation of 21 miles of sewage pipes in the Mexicali metropolitan area were completed in March 2007. USIBWC is working with its Mexican Counterpart (CILA) and other federal and state agencies on both sides of the International Boundary, including the Regional Board, to address New River water quality problems at the Boundary. Table 10.3 identifies BTAC members.

Table 10.3: BTAC Members

Mexico	**United States**
CILA (IBWC, Mexican Section)	USIBWC (IBWC, U.S. Section)
CNA (Comision Nacional del Agua, Mexican National Water Commission)	USEPA
CESPM (State Public Services Commission of Mexicali)	California State Water Resources Control Board
CEA (Comision Estatal Del Agua)	California Regional Water Quality Control Board, Colorado River Basin Region
Municipality of Mexicali	Imperial County
	IID
Border Environment Cooperation Commission (BECC), Mexico Section	Border Environment Cooperation Commission (BECC), U.S. Section

The establishment of BTAC has improved communication and technology transfers between the two countries. California Environmental Protection Agency (Cal EPA), particularly SWRCB and Regional Board, remain committed to working with all agencies/groups involved in addressing New River pollution problems.

G.3. Citizens Congressional Task Force on the New River (CCTF)

CCTF, managed by Desert Wildlife Unlimited Inc., coordinated with U.S. Bureau of Reclamation (USBR) to construct two wetlands in Imperial County to treat polluted water from the New River and agricultural drains (Tetra Tech Inc. and Wetlands Management Services, 2005). CCTF partnered with Imperial County and received a 1998 Salton Sea Reclamation Act Grant that partially funded these projects. IID provides in-kind matching funds (donated land) for the wetlands. Congress, through the USBR, allocated $3 million for construction of the wetlands. These projects focus on wetland removal of

silt, pesticides, and selenium pollution in New River and agriculture drain water. Comprehensive water quality monitoring is conducted on influent/effluent waters, as well as invertebrate, plant, bacteria, and wildlife studies. Water quality data at the two locations will be used to evaluate pollutant removal and wetland effectiveness in addressing New River pollution. The data may also facilitate future design modifications.

G.4. North America Development Bank (NADBank)

The North America Development Bank (NADBank) was created by the North American Free Trade Agreement (NAFTA). NADBank is a binational funded organization, in which Mexico and the United States are equal partners. NADBank is the lead financier for public entities seeking financing for environmental infrastructure projects in the International Boundary region. NADBank also assists border communities identify funding sources and design financial plans for wastewater infrastructure projects (NADBank, 2001). Services provided by NADBank include:

- Participation in bond issues;
- Interim financing;
- Grant resources and government budget allocations through Border Environment Infrastructure Funds (BEIF);
- Loan guaranties; and
- Technical assistance through BECC.

G.5. BECC

BECC was created by NAFTA. BECC is a binational organization with headquarters in both countries. BECC developed a Technical Assistance Program to assist border communities with preliminary engineering and design studies. The focus of the Technical Assistance Program is to: (a) develop projects that address environmental problems; (b) achieve BECC certification for projects; (c) provide grants to communities for technical assistance; and, (d) assist communities in obtaining BECC certification—a prerequisite for funding eligibility from NADBank and/or other sources. Funding for projects under the Technical Assistance Program comes from USEPA (BECC, 2001).

G.6. California Border Environment Cooperation Commission (CALbecc)

CalBECC was created in 1994 by the Governors of California, Baja California, and Baja California Sur. CalBECC identifies and promotes environmental infrastructure projects along the Boundary, establishes Boundary priorities, and solicits project funding. CalBECC can assist WWTP owners in soliciting funds for compliance with this TMDL. The CalBECC staff is within the State Water Resources Control Board's Border Program.

G.7. City of Calexico New River Committee (CCNRC)

CCNRC is a nonprofit organization organized in 1999. Their primary goal is to encase the New River through the Calexico area. This committee is seeking approximately $50 million from the U.S. Congress and others to finance the project. Committee members are: U.S. Border Patrol, Calexico School District, Campesinos Unidos, City of Calexico, Imperial County, IID, Imperial Valley College, and San Diego State University – Imperial Valley Campus.

G.8. University of California Cooperative Extension (UCCE), Holtville Field Station

The University of California Cooperative Extension (UCCE) was developed to apply university resources to local communities. UCCE offers workshops, programs, and technical assistance to growers on a broad range of agricultural topics, including conservation management practices. UCCE farm advisors conduct research on local problems, and extend that information, along with other related research, to local stakeholders. UCCE's Holtville Field Station conducts demonstration projects and research for preventing/mitigating potential water quality impacts. They also provide training courses and technical assistance for stakeholders.

G.9. United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)

The United States Department of Agriculture Natural Resources Conservation Service (NRCS) is a federal assistance agency. NRCS provides technical assistance in securing finances for implementation of management practices. NRCS assists NPDES CAFOs in developing plans and specifications for containment prescribed by the general CAFOs NPDES permit.